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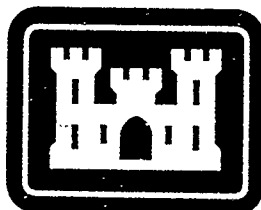
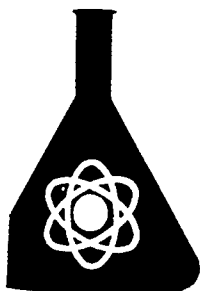
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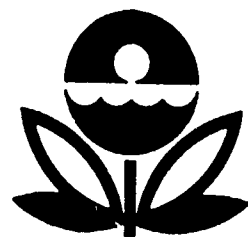
CONTRACTOR OPERATIONS

Post Remedial Action Report Lansdowne Radioactive
Residence Complex Dismantlement/Removal Project

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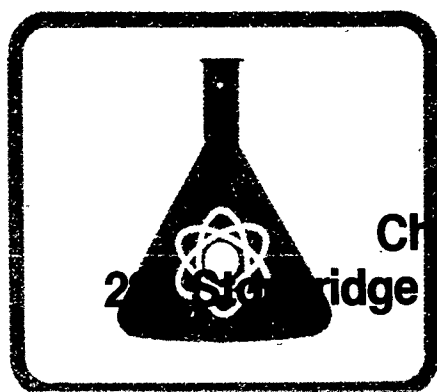
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VOLUME II

CONTRACTOR OPERATIONS

Post Remedial Action Report Lansdowne Radioactive
Residence Complex Dismantlement/Removal Project



Prepared By

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for

**Department of the Army
Baltimore District, Corps of Engineers**

**Pennsylvania
Baltimore, Maryland 21203**

under interagency agreement with

The United States Environmental Protection Agency

Region III

**841 Chestnut Building
Philadelphia, Pennsylvania 19107**



June 1990

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13. ABSTRACT (Maximum 200 words) The Operations Closeout Report was prepared to document the successful completion of final remediation of the USEPA Superfund Cleanup of a radium-contaminated duplex residence and associated properties located in Lansdowne, Pa. This report addresses the Prime Contractor's efforts to perform the residence dismantlement, soil remediation, and restoration of the site to a useable condition. following the cleanup. The report covers the period from contract award through all stages of project conduct, including plan preparation, mobilization, initial site preparation, site clearing and security arrangements, dismantlement of structures, excavation of contaminated soils, transportation and disposal of radioactively contaminated and hazardous wastes, final verification of compliance to release criteria, site restoration and demobilization. Pertinent data such as final waste volumes, results of testing, and site configuration prior to, during and post remediation are included. The site organizational structure, individual responsibilities and subcontractors utilized are provided.

Keywords: Radioactive contamination/wastes; Decontamination/sites; Recovery/buildings/sewers;

14. SUBJECT TERMS Final Report, radium, remediation, USEPA Superfund, soil excavation, residence dismantlement, hazardous waste, radioactive waste, transportation, disposal, cleanup. 15. NUMBER OF PAGES 127 16. PRICE CODE

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→ Radioactive hazards; Radioactivity/debris/
removal; Health physics; Pavements/excavation/
replacement; Soils/contamination; Backfills/
moisture content; Hazardous materials;
Contaminants/disposal; Residential section.
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LANSDOWNE

**RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT**

OPERATIONS CLOSEOUT REPORT

***CHEM-NUCLEAR SYSTEMS, INC.
220 STONERIDGE DRIVE
COLUMBIA, SOUTH CAROLINA***

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LANSLOWNE RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT

OPERATIONS CLOSEOUT REPORT

FORWARD

During the period of June 2, 1988 through August 1, 1989, Chem-Nuclear Systems, Incorporated performed dismantlement and removal operations associated with a radioactive residence complex located on East Stratford Avenue in Lansdowne, Pennsylvania. This work was performed under contract to the U.S. Army Corps of Engineers, Baltimore District. In order to assure that all work was performed in a safe manner and within requirements established by contract documents, local, state and federal regulations and in compliance with all applicable codes and standards, work was conducted in accord with detailed plans established prior to beginning site work. In addition, specific actions were further delineated by use of task specific Phase Hazard Analyses prepared and approved on site.

The purpose of the following chapters is to provide information relative to operational activities conducted on site. Specific radiological data is provided in the Radiological Closeout Report.

A chronological listing of significant project events and activities is shown in Figure i-1.

FIGURE i-1
PROJECT CHRONOLOGICAL HISTORY

1 June	88	Borough Meeting
2 June	88	Pre-Construction Conference
2 June	88	Notice to Proceed
14 June	88	Pre-Construction Plan Review Conference
15 July	88	Public Meeting
1 August	88	Mobilize to Lansdowne - Begin Training and Site Set up
18 August	88	Initial Entry Inspection
24 August	88	Began building contents removal, 105 residence
30 August	88	Began interior dismantlement, 105 residence
8 Sept	88	First radioactive waste shipment
17 Sept	88	Complete interior dismantlement, 105 residence
19 Sept	88	Began contents removal, 107 residence
20 Sept	88	Began interior dismantlement, 107 residence
30 Sept	88	Completed interior dismantlement, 107 residence
3 Oct	88	Began garage dismantlement, 105 residence
8 Oct	88	Completed garage dismantlement, 105 residence
10 Oct	88	Began residence exterior dismantlement
18 Nov	88	Completed residence exterior dismantlement to 1st floor
22 Nov	88	Began soil excavation
5 Dec	88	Began test area excavation
10 Dec	88	Completed test area excavation
16 Dec	88	Completed base scope soil excavation (1000 tons)
19 Dec	88	Completed contract scope soil excavation (1150 tons)
31 Jan	89	Started residence basement/foundation removal
23 Feb	89	Began 107 garage removal
25 Feb	89	Completed 107 garage removal
27 Feb	89	Completed residence basement/foundation removal
31 Mar	89	Began sewer main excavation
19 Apr	89	Dismantled 110 garage, started 112 garage dismantlement
21 Apr	89	Completed 112 garage dismantlement.
1 May	89	Completed sewer installation
8 May	89	Completed soil excavation
9 May	89	Began backfill

2 June	89	Completed backfill
5 June	89	Began 110/112 garage driveway construction
6 June	89	Final rad waste shipments completed
12 June	89	Completed repaving Stratford Avenue
25 July	89	Completed garage & drawings
25 July	89	Demobilized
1 August	89	Final site inspection



LANSDOWNE

**RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT**

OPERATIONS CLOSEOUT REPORT

***CHEM-NUCLEAR SYSTEMS, INC.
220 STONERIDGE DRIVE
COLUMBIA, SOUTH CAROLINA***

CHAPTER 1 ORGANIZATION AND STAFFING

CHAPTER 1

ORGANIZATION AND STAFFING

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LANSLOWNE RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT

OPERATIONS CLOSEOUT REPORT

CHAPTER 1:

ORGANIZATION AND STAFFING

1.0 INTRODUCTION

During conduct of site activities, a variety of personnel were utilized to assure adequate levels of supervisor, radiological control, safety monitoring, status, cost and schedule tracking, security, medical coverage, equipment operation and labor support. Selection, qualification, training and conduct of personnel were in accordance with the plans established prior to beginning site work.

This chapter provides a summary of the organization and staff utilized during the project. The overall site organization is shown in Figure 1-1. Personnel assigned to the project are shown in Figure 1-2.

2.0 RESPONSIBILITIES

2.1 PROJECT MANAGER

The Project Manager, Raymond L. Huston, Chem-Nuclear Systems, Inc. maintained overall responsibility for the activities of Chem-Nuclear Systems, Inc. and their subcontractors for this project. This included control of day to day work activities, planning, scheduling, cost tracking, safety, radiological controls, quality assurance, and full compliance with all requirements of the contract, Plans, regulations, codes and standards. He provided the primary point of contact for all communications with the U.S. Army Corps of Engineers On-Site Representative. Mr. Huston was assigned on a full time basis to

the project from Notice to Proceed on June 2, 1988 through demobilization and the final inspection on August 1, 1989.

2.2 SITE HEALTH PHYSICIST

The Site Health Physicist, Peter A. Trujillo IV, Chem-Nuclear Systems, Inc., reported to the Project Manager and was chartered with specific responsibility for the project radiological controls program. This included the radiological personnel monitoring programs, surveys, environmental protection, personnel protection, surveys, contamination monitoring, soils testing and analysis, instrumentation maintenance and free release surveys of equipment and the site. Associated with this he was responsible for day to day work assignment of Radiological Controls Technicians and coordination of activities with other site personnel. Mr. Trujillo was assigned to the project on a full time basis from Notice to Proceed on June 2, 1988 through final release from radiological controls on June 12, 1989..

2.3 SITE HEALTH AND SAFETY OFFICER

The Site Health and Safety Officer, John Soyak, Engineering Sciences, was tasked with specific responsibility for monitoring and overview of the project industrial health and safety programs. This included task analysis, Phase Hazard Analysis preparation, health and safety monitoring and reporting, administration of site security and maintenance of all associated records. Associated with these responsibilities, he was responsible for day to day work assignment and supervision of the on site medical technician and security guard force. Mr. Soyak was assigned to the project on a full time basis from mobilization on site on August 1, 1988 through termination of site security and medical monitoring programs on June 10, 1989.

2.4 SITE SUPERINTENDENT

The Site Superintendent, Frank Peel, Chem-Nuclear Systems, Inc.

was tasked with direction and coordination of day to day operations activities on the project. Associated with these responsibilities, he performed day to day assignment and supervision of site equipment operators, laborers and subcontractors performing work on site. Mr. Peel was assigned to the project on a full time basis from just prior to mobilization until after completion of excavation of contaminated soil and start of backfill on May 26, 1989.

2.5 OFFICE MANAGER

The project Office Manager, Sharon V. Johnson maintained responsibility for coordination of all project administrative functions including cost control and tracking, schedule updating, billing, clerical support and office facilities and equipment support. Ms. Johnson was assigned to the project on a full time basis from mobilization on August 1, 1988 through July 14, 1989.

2.6 SHIPPING BROKER

The project Shipping Broker, Mike Pletcher was responsible for coordination of all radioactive waste shipping activities including proper packaging, survey, activity calculation, weighing scheduling, loading, transport, disposal facility receipt verification and all associated documentation. Mr. Pletcher was assigned to the project for the duration of radioactive waste transport activities between August 31, 1988 through June 6, 1989.

2.7 RADIOLOGICAL CONTROL TECHNICIANS

The Radiological Control Technicians, Hilbert and Associates, Inc. employees, of which seven were assigned during peak project activities, were responsible for performance of all project radiological tasks. These tasks included contamination surveys of personnel, materials, equipment and facilities, monitoring of

waste materials to determine disposal status, soils survey and sampling, airborne, contamination sampling, instrument checkout and operation, and on the job radiological and personnel safety monitoring.

2.8 EQUIPMENT OPERATORS

Equipment Operators, Carlucci Construction Company employees, of which four were assigned during peak project activities, were responsible for operation of heavy equipment in support of project activities. Also included in their duties was assistance to the Site Superintendent in coordinating and direction of labor activities.

2.9 LABORERS

Laborers, Carlucci Construction Company employees, of which 7 were assigned during peak project activities, were responsible for all manual tasks and operation of small equipment in support of project activities.

2.10 MEDICAL TECHNICIANS

The project Medical Technicians, Concorde employees, were responsible for employee medical monitoring during periods of concern for heat and cold stress, first aid treatment on site and were available on site should the need arise for emergency medical coverage. In addition, they assisted the Site Health and Safety Officer in maintenance of personnel protective equipment.

2.11 SECURITY GUARDS

Security Guards, employees of General Security Systems, were utilized to maintain around the clock surveillance of the project site. This included control of personnel access utilizing a badging system.

2.12 SUBCONTRACTOR SERVICES

During the course of the project, several additional subcontractors were utilized in support of project activities. A listing of the subcontractors used on site as well as major subcontractors providing off site services is provided in Figure 1-3.

CHEM-NUCLEAR SYSTEMS, INC. LANSDOWNE PROJECT ORGANIZATION

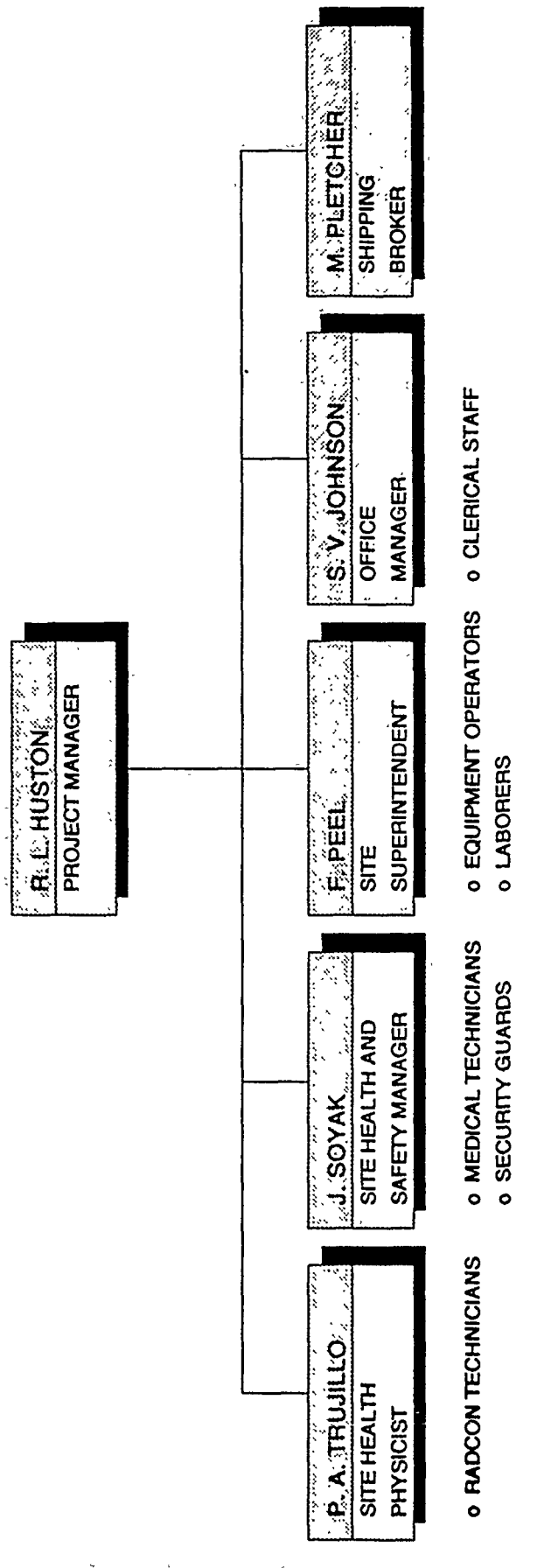


FIGURE 1-1
 PROJECT ORGANIZATION

LANSDOWNE RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT

PROJECT PERSONNEL ASSIGNMENTS

<u>Name</u>	<u>Title</u>	<u>Period Assigned</u>
Chem-Nuclear Systems, Inc.		
Raymond Huston	PM	8/1/88-7/25/89
Sharon Johnson	OM	8/1/88-7/14/89
Frank Peel	PS	8/1/88-5/25/89
Michael Pletcher	SB	9/15/88-6/5/89
Peter Trujillo	SHP	8/1/88-6/10/89
Engineering-Sciences, Inc.		
John Soyak	SH&SO	8/1/88-6/10/89
Hilbert & Associates, Inc.		
Mark Cafouras	SRRCT	8/1/88-6/3/89
Shaw Heffernan	SRCT	8/1/88-6/9/89
Larry Howie	RCT	12/12/88-5/13/89
William Jeske	RCT	8/1/89-5/13/89
Thomas Mojica	RCT	8/1/88-5/26/89
William Rigby	RCT	8/1/88-7/6/89
Michael Zigo	SRRCT	8/1/88-7/20/89

Carlucci Hazardous Waste Services

Robert Bowser	EO	8/1/88-6/21/89
Randy Fello	L	8/1/88-6/15/89
Elwaine Fox	EO	8/1/88-6/15/89
Kenneth Goodwin	FLO	8/1/88-5/13/89
William Hazlett	L	8/1/88-7/15/89
Richard Livengood	L	8/1/88-5/13/89
Robert Nameth	L	8/1/88-5/4/89
William Seitz, Jr	EO	8/1/88-6/21/89
William Seitz, SR	EO	8/1/88-4/26/89
Michael Stanton	L	8/1/88-5/13/89
Marshall Utiss	L	11/28/88-5/13/89
Thomas Schwartz	L	8/1/88-11/12/89

Concorde, Inc.

Kathleen Sitasz	EMT	8/1/88-5/20/89
Nancy Schultz	IN	8/1/89-5/20/89
Sharon Laverty	IN	8/1/88-5/20/89
Tom Elwood	EMT	8/1/88-5/20/89

General Security Systems, Inc.

Shanel Benson	SG	8/1/88-6/6/89
Michael Leon	SG	9/20/88-6/6/88
Nadine Stanley	SG	8/1/88-5/20/89
Gerald Wright	SG	8/1/88-6/6/89
Chuck O'Donnel	SG	8/22/88-3/15/89

<u>SUBCONTRACTOR</u>	<u>SERVICE PROVIDED</u>
Eagle Tree Service	Tree Removal/Landscaping
Unlimited Ceilings	Garage Construction
R.J. De Frank, Concrete Contractor	Driveway Replacement
R. Jensen, Masonry Contractor	Garage Foundations/Stucco
J. Cunningham, Pavement Contractor	Asphalt Paving
Wells Fargo Security Systems	Video Camera/Recording System
Nu-Way Disposal	Trash/Uncontaminated Waste Removal
Helgesen Scientific	Whole body counting
Catania Engineering	Structural Analysis & Engineering
Photo Research	Project Photography
Ranger Transportation	Radioactive Waste Transport
GSX Services	Hazardous Waste Disposal
Barringer Labs	Offsite Radiological Analysis
Pittsburgh Testing Laboratories	Compaction Density Testing
Cavalier Steel and Fence	Replacement Fencing
Container Products Corp.	Radioactive Waste Containers
Envirocare of Utah	Radioactive Waste Disposal
Concorde, Inc.	Medical Surveillance
Hilbert and Associates	Radiological Services
Engineering Sciences	Industrial Hygiene/Safety
General Security	Security Guard Services
Carlucci Construction Company	Construction Personnel/Equipment
Jacee Electric	Site Electrical Service
Adia Personnel Services, Inc.	Temporary Clerical Personnel
Accountemps	Temporary Clerical Personnel

Subcontractor Services

Figure 1-3



LANSDOWNE

**RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT**

OPERATIONS CLOSEOUT REPORT

***CHEM-NUCLEAR SYSTEMS, INC.
220 STONERIDGE DRIVE
COLUMBIA, SOUTH CAROLINA***

CHAPTER 2 PRE-MOBILIZATION ACTIVITIES

CHAPTER 2

PRE-MOBILIZATION ACTIVITIES

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LANSDOWNE RADIOACTIVE RESIDENCE COMPLEX
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CHAPTER 2

PRE-MOBILIZATION ACTIVITIES

1.0 INTRODUCTION

Subsequent to receipt of the Notice to Proceed from the U.S. Army Corps of Engineers on June 2, 1988, Chem-Nuclear Systems, Inc. began those activities required in support of mobilization to the project site on August 1, 1988. With the exception of various pre-project meetings, all of these activities were carried out in the Columbia, South Carolina Headquarters Office. This Chapter provides an overview of activities performed during this period.

2.0 MEETINGS AND CONFERENCES

2.1 On June 1, 1988, a meeting was held in Lansdowne, Pennsylvania between the Lansdowne Borough Council and representatives from the U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, Argonne National Laboratory, Pennsylvania Department of Environmental Resources and Chem-Nuclear Systems, Inc. The purpose of this meeting was to outline the planned project activities and schedule, identify responsible organizations, introduce principal personnel involved and address areas of concern to parties present.

2.2 On June 2, 1988, a Pre-Construction and Pre-Work Safety Conference was held at the U.S. Environmental Protection Agency Region III Headquarters in Philadelphia, Pennsylvania with representatives from the U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, Argonne National Laboratory, Pennsylvania Department of

Environmental Resources and Chem-Nuclear Systems, Inc. The purpose of this meeting was to review contract requirements relative to submittals, contractor quality control, safety, labor requirements, environmental protection, value engineering, procurement, project schedule and payment. The principle features of work to be performed were also reviewed.

2.3 On June 14, 1988, a Pre-Construction Plan Review Conference was held at the U.S. Environmental Protection Agency Region III Headquarters Office in Philadelphia, Pennsylvania with representatives from the U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, Argonne National Laboratory and Chem-Nuclear Systems, Inc. in attendance. The purposes of this meeting were to identify the emergency response organization, individual responsibilities, reporting requirements and to review comments and concerns associated with the Contractor Quality Control Plan and the Safety Health and Emergency Response Plan.

2.4 On July 13, 1988, a public meeting was held in Lansdowne, Pennsylvania with local residents, Borough Council Members, local press representatives and other concerned individuals. At this meeting, representatives of the U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, Argonne National Laboratory and Chem-Nuclear Systems, Inc. provided an overview of planned project activities and schedule, anticipated impact on the community and responded to questions and concerns of the public.

3.0 PRE-MOBILIZATION PROCUREMENT

3.1 MATERIALS AND EQUIPMENT

During the pre-mobilization phase, Chem-Nuclear Systems, Inc. placed orders for long lead materials and equipment as well as those necessary for start of project work on site. These materials included consumable supplies, personnel protective equipment, instrumentation, tools, waste containers, temporary

project facilities and radiological supplies. Orders were placed for delivery commensurate with anticipated scheduled need dates.

3.2 VENDOR SERVICES

Prior to mobilization, open purchase orders were placed with project area vendors to facilitate obtaining materials and equipment on an as needed basis during the project. These orders were placed with hardware, office supply, lumber, and rental equipment suppliers selected for service provided and proximity to the project.

4.0 CONTRACT PLACEMENT

Prior to mobilization, Chem-Nuclear placed contracts with those known companies selected to provide support services to the project. These included the construction subcontractor, disposal facility, waste transporter, medical coverage provider, security service and radiological support supplier. Contracts were established based upon anticipated project start, duration, staffing levels and scope of work as defined by the contract with the U.S. Army Corps of Engineers.

5.0 STAFF SELECTION AND TRAINING

Following Notice to Proceed and prior to mobilization to the project site, Chem-Nuclear Systems, Inc. and those selected subcontractors providing personnel for the project organized specific staffing. This included evaluation of personnel experience and training, review against anticipated staffing needs, verification of individual availability for the project duration and notification of personnel. During this time, additional training needs such as the OSHA Hazardous Waste Training and technical qualifications were conducted as necessary. Final assignment of key staff positions were made as early as possible to ensure involvement in the preparation and review of project plans, procedures and schedules.

6.0 PREPARATION OF PLANS AND SUBMITTALS

The major effort during the pre-mobilization period was preparation of project Plans and submittals. A listing of these is provided in Figure 2-1. Preparation of each Plan was coordinated to assure adequate in house review time prior to submittal to the U.S. Army Corps of Engineers. To the extent possible, personnel assigned project responsibility for actions associated with specific Plans were utilized to author the document. Each Plan was subjected to a multi-level in house review, including approval by the corporate Safety Review Board as appropriate. Plans and Submittals were prepared and reviewed for submittal to the U.S. Army Corps of Engineers in a sufficiently timely manner to allow for review, comment incorporation and approval. Upon approval, all Plans were introduced into the Chem-Nuclear Systems, Inc. document control system revision control.

7.0 DETAILED PROJECT SCHEDULE

The detailed project schedule, prepared during the pre-mobilization period, incorporated known events into a logical sequence, with anticipated task durations and projected dates of accomplishments. This schedule provided the baseline for staff assignment, material and equipment procurement and coordination of project activities. It was utilized during project performance to track performance of tasks, coordinate interdependent activities and analyze progress for planning and billing purposes.

- o Safety, Health and Emergency Response Plan
- o Contractor Quality Control Plan
- o Site Plan
- o Site Preparation Plan
- o Remedial Action Plan
- o Radioactive Waste Management and Disposal Plan
- o Asbestos Removal and Disposal Plan
- o Non-Radioactive, Non-Hazardous Waste Management and Disposal Plan
- o Site Restoration Plan
- o Project Administration and Management Plan
- o Schedule and Critical Path Management Plan
- o Photography Plan
- o Environmental Protection Plan
- o Spill Control Plan
- o Site Utilities Plan
- o Site Security Plan
- o Recordkeeping and Data Management Plan
- o Closeout Document Provision Plan
- o Detailed Schedule

Project Plans and Submittals
Figure 2-1



LANSLOWNE

**RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT**

OPERATIONS CLOSEOUT REPORT

***CHEM-NUCLEAR SYSTEMS, INC.
220 STONERIDGE DRIVE
COLUMBIA, SOUTH CAROLINA***

CHAPTER 3 SITE PREPARATION

CHAPTER 3

SITE PREPARATION

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LANSLOWNE RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT

OPERATIONS CLOSEOUT REPORT

CHAPTER 3

SITE PREPARATION

1.0 INTRODUCTION

During the period from August 1, 1988 through August 24, 1988, Chem-Nuclear Systems, Inc. mobilized personnel and equipment to the Lansdowne, Pennsylvania project site and made preparations for start of removal of contaminated material from the project. This chapter describes activities conducted during this project phase.

2.0 MOBILIZATION

On July 31, 1988 and August 1, 1988, assigned project personnel were mobilized to the Lansdowne, Pennsylvania area in preparation for conduct of project activities. By prior arrangement with the Borough of Lansdowne, the Borough Hall was utilized as a base of operations during the first ten days of activity. Arrangements were made with the Borough to assume responsibility for site surveillance and to close off Stratford Avenue so that project activities could commence.

3.0 TRAINING

During the first week, three training classes were conducted for all site employees and selected personnel from the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers. The purposes of this training were to familiarize personnel with anticipated project activities, define individual responsibilities, train personnel in methods of protection associated with handling of radioactive material and provide instruction in industrial safety requirements. Training included classroom instruction, demonstration of use of instrumentation

and personnel protective equipment and performance of practical factors such as use of personnel protective clothing and frisking. Following training, testing was administered to insure individual understanding of subject matter and to document training.

4.0 WHOLE BODY COUNTING AND PHYSICAL EXAMINATIONS

Prior to utilization of personnel on site, each individual received whole body counting to provide a baseline for potential internal radioactive contamination. This was performed in a mobile laboratory brought to the site by Helgeson Scientific. Specific details of these counts and results are provided in the Radiological Closeout Report. In addition, physical examinations were conducted for all subcontract personnel to provide baseline data, obtain historical information and evaluate fitness for work. Physicals were conducted and results evaluated by Concorde, Inc.

5.0 SITE FACILITIES

5.1 The Operations Support Facility (OSF), a 24 foot by 24 foot modular steel panel building was constructed on E. Stratford Avenue. The foundation for this structure was of compacted asphalt cold patch material and six inch by six inch hardwood timbers. A 3/4 inch plywood floor was placed over the asphalt base to provide a stable working surface and to minimize contamination of the asphalt. This structure was utilized as the primary access and egress point for the site, provided dry storage space for tools, equipment and materials, provided a location for surveying and weighing waste packages removed from the site, and provided space for conduct of radiological support work and decontamination activities. The OSF was provided with electrical power and equipped with a 1000 cubic foot per minute High Efficiency Particulate Air Filter ventilation system for use during activities with potential for generation of airborne contamination. This facility was utilized from completion of construction on August 11, 1988 until April 3, 1989 when it was dismantled to facilitate access for excavation of contaminated soil.

- 5.2 The Chem-Nuclear Systems, Inc. office, a 12 foot by 60 foot mobile office housed offices, administrative support equipment, records and personnel. This unit was placed along the south side of E. Stratford Avenue on August 8, 1988 and was utilized until it was removed to allow access for sewer excavation on February 20, 1989.
- 5.3 The crew/break trailer, a 12 foot by 44 foot mobile office trailer was equipped with a first aid station, personal lockers, contaminated and sanitary showers, laundry facilities and a lunchroom. This unit was placed along the north side of E. Stratford Avenue on August 10, 1988 and utilized until its removal on May 15, 1989.
- 5.4 The U.S. Army Corps of Engineers Resident Engineer office, an 8 foot by 32 foot mobile office was located along the north side of E. Stratford Avenue just east of the crew/break trailer. This unit provided office space and housed the video monitoring and recording equipment and was utilized from its installation on August 8, 1988 through its removal on June 6, 1989.
- 5.5 The Argonne National Laboratory mobile laboratory was set up along the south side of E. Stratford Avenue, east of the Chem-Nuclear Systems, Inc. office. It remained in this location until February 16, 1989, when it was relocated to the 117 E. Stratford Avenue residence driveway to allow access for sewer work. It was removed from the site on June 19, 1989.
- 5.6 Various utility and service needs were placed in use during the preparatory phase. Included were electrical power, site perimeter lighting, telephones, garbage service, chemical toilets and potable water. These services were in use during the entire project duration, with changes made as necessary to accommodate varying site activities and staff size.

- 5.7 During the period August 4, 1988 through August 9, 1988, an eight foot chain link fence was constructed around the perimeter of the project site. This included access gates at both ends of E. Stratford Avenue and on Maple Avenue for personnel and equipment access. This fencing provided a security boundary to preclude access to the work area by unauthorized personnel and protection for equipment within its confines.
- 5.8 As required by the contract, a pole mounted video camera was installed and connected to the monitoring and recording equipment in the U.S. Army Corps of Engineers Resident Engineer office trailer. From start of operation on August 24, 1988 through June 6, 1989, the system monitored and recorded site activities on a 24 hour per day, seven days per week basis. Recorded video tapes were retained by the U.S. Army Corps of Engineers.
- 5.9 A small, 6 foot by 8 foot guard shack was procured and placed on site near the east access gate on August 25, 1988. This structure was utilized for the security guard post, security badge issuance and access control.
- 5.10 On August 21, 1988, environmental monitors were installed at the North, South, East and West perimeters of the site. These units were utilized for on line sampling of air to monitor for the presence of airborne radioactive particulates which could be generated as a result of dismantlement and excavation activities. These monitors were in service 24 hours per day, seven days per week until after completion of radioactive work on May 1, 1989.

6.0 SECURITY

Beginning on August 3, 1988, site security personnel started around the clock surveillance of the project site. This was enhanced with completion of the perimeter fence on August 9, 1988 installation of

perimeter lighting on August 12, 1988 and installation of the guard shack on August 25, 1988. Full security badging was implemented on August 20, 1988. Site security was maintained until June 6, 1989.

7.0 SITE CLEARING

Clearing of trees and vegetation from the site began in support of fence construction on August 4, 1988 and was completed on August 22, 1988 with shipment of the last clean waste off site. All materials removed during site clearing were carefully surveyed prior to loading in steel drop off containers (20 and 25 cubic yard capacities). A total of six containers (28.02 tons) of clean waste were generated during this activity. Material was transported to the GROWS landfill for disposal.

***LANSDOWNE***

**RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT**

OPERATIONS CLOSEOUT REPORT

***CHEM-NUCLEAR SYSTEMS, INC.
220 STONERIDGE DRIVE
COLUMBIA, SOUTH CAROLINA***

**CHAPTER 4
STRUCTURE INTERIOR DISMANTLEMENT**

CHAPTER 4

STRUCTURE INTERIOR DISMANTLEMENT

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LANSDOWNE RADIOACTIVE RESIDENCE COMPLEX
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OPERATIONS CLOSEOUT REPORT

CHAPTER 4

STRUCTURE INTERIOR DISMANTLEMENT

1.0 INTRODUCTION

During the period from August 18, 1988 through October 8, 1988, Chem-Nuclear Systems, Inc. and their subcontractors removed all residual contents and dismantled internal non-structural components from both sides of the residence at 105 and 107 E. Stratford Avenue, Lansdowne, Pennsylvania. This chapter describes the activities associated with that project phase.

2.0 INITIAL ENTRY

On August 18, 1988, an initial entry was performed into the structure. Project personnel, accompanied by structural engineers from Catania Engineering Associates, Inc. entered the structure and performed an initial inspection of the building interior and basic structure. The building was found to be structurally sound and considered safe for start of dismantlement activities. To the extent possible, load bearing walls and features were identified to preclude inadvertent removal during the removal of building interior components. Preliminary radiological surveys were performed at this time.

3.0 CONTAINMENT AND VENTILATION

On August 19, 1988 through August 22, 1988 preparations of the building containment and ventilation systems for dismantlement of the interior were made. Containment was established by sealing of all windows, cracks, and doorways with plastic, tape and caulking. Containments were erected over the main and rear chimneys to allow dismantlement and a

waste packaging structure erected at the northwest corner of the residence to accommodate waste loadout. Ventilation units with High Efficiency Particulate Air (HEPA) filters and a combined capacity of 3000 cubic feet per minute were installed, with a combined, monitored exhaust. On August 22, 1988, an initial inspection was conducted by the U.S. Army Corps of Engineers and authorization to proceed with interior dismantlement given. Included in this inspection was smoke and air flow testing to assure containment of any potential airborne particulate.

4.0 DISMANTLEMENT OF 105 RESIDENCE INTERIOR

- 4.1 On August 24, 1988, removal of loose contents from the 105 residence commenced. Materials consisting of trash, plumbing fixtures, radiators, doors and remaining personal possessions were surveyed to determine radiological status. All materials were determined to be contaminated and were packaged for disposal as radioactive waste in the waste packaging structure. Removal of contents was completed on August 29, 1988.
- 4.2 In order to allow removal of the interior portions of the residence chimneys concurrent with interior dismantlement, it was necessary to first remove the external portions. This was accomplished by workers inside temporary, HEPA ventilated containments on the residence roof. Waste materials were dropped inside the flues until they were filled to the roof level, then were passed through to the interior and carried to the first floor for packaging. All materials were surveyed, determined to be contaminated and packaged as radioactive waste. Removal of the exterior portion of the rear chimney was accomplished during the period August 27, 1988 through August 30, 1988 and the exterior portion of the main chimney August 30, 1988 through September 1, 1988.
- 4.3 Removal of interior non-structural components of the 105 residence began with the third floor and attic areas. Non-structural components consisted of ceilings, plaster and lath walls, flooring, internal portions of chimneys and all non-load

bearing internal partition walls. In general, work began with the ceiling, followed by walls and progressing to the floor. The 105 residence third floor interior dismantlement was performed from August 30, 1988 through September 9, 1988. Waste materials removed were surveyed to determine radiological status and carried to the first floor for packaging. All wastes were found to be contaminated and were packaged as radioactive waste.

- 4.4 Dismantlement of the 105 residence second floor interior began concurrent with third floor flooring on September 6, 1988 and was completed on September 12, 1988. Removal of materials and waste handling was conducted in the same manner as for the third floor.
- 4.5 The interior dismantlement of the first floor of the 105 residence was begun on September 11, 1988 concurrent with dismantlement of the second level flooring and was completed on September 16, 1988. Removal of materials and waste handling were as previously discussed, except that the flooring was left in place for use as containment during basement dismantlement activities.
- 4.6 On September 13, 1988, an additional structural inspection was performed by Catania Engineering Associates, Inc. to assure structural integrity of the remaining building components. Results of this inspection were satisfactory, with some remaining non-structural features identified and removed.
- 4.7 On September 16, 1988, an inventory of the contents of nine drums of waste material remaining from previous attempts to decontaminate the residence were inventoried. These drums, stored in the 105 basement, were opened, contents examined and waste segregated. Waste materials which were obviously non-hazardous were disposed of as radioactive waste. Materials which were of unknown chemical content or which were potentially hazardous were consolidated into four drums, inventoried, and set aside for later disposition.

5.0 DISMANTLEMENT OF 107 RESIDENCE INTERIOR

- 5.1 On September 17, 1988, preparations were made to begin dismantlement operations for the 107 residence. This included sealing of all openings and relocation of HEPA ventilation systems from the 105 side to the 107 side. An access way was cut through the common interior wall on the first floor rear porch to allow movement of waste materials to the packaging area. Access was also made from the front of the 107 side into the enclosed front porch of the 105 side to allow for temporary storage of furniture removed from 107.
- 5.2 In order to allow removal of the internal portions of the two chimneys, the exterior portions were removed prior to interior dismantlement. The above roof portion of the 107 rear chimney was removed during the period of September 19, 1988 through September 20, 1988 and the main chimney from September 22, 1988 to September 23, 1988. Due to reduced contamination levels on this side of the residence, removal of the chimneys was conducted without containment, with dust abatement by localized HEPA suction through the flues and by utilization of water misting.
- 5.3 On September 19, 1988, removal of the 107 residence contents was begun. Initially, items of furniture belonging to the property owners were removed and placed in temporary storage on the 105 residence front porch, awaiting survey and decontamination. This was followed by removal of all remaining plumbing fixtures, radiators, internal doors and trash. Cleanup was coordinated to allow concurrent start of interior dismantlement. All waste materials were surveyed, found to be contaminated and packaged as radioactive waste. Removal of contents was completed on September 22, 1988.
- 5.4 Dismantlement of the 107 residence interior began with the third floor and attic areas. All ceilings, plaster and lath walls, flooring, internal portions of chimneys and all non-load bearing internal partition walls were removed. In general, work began

with the ceiling, then the walls and finally the flooring. The 107 residence third floor interior was dismantled from September 20, 1988 through September 24, 1988. All waste materials were surveyed, found to be contaminated, carried to the first floor and packaged as radioactive waste in the packaging structure adjacent to the 105 side of the residence.

- 5.5 Concurrent with removal of the 107 residence third floor flooring, dismantlement of the second floor was begun on September 22, 1988 and completed on September 28, 1988. Work progress and waste handling was accomplished in the same manner as for the third floor.
- 5.6 Based upon off site analytical results for material samples taken on September 20, 1988, two small areas of asbestos bearing pipe insulation were identified in the basement of the 107 residence. On the second shift on September 27, 1988, workers removed the two sections and processed them for disposal. Prior to removal, special attention was given to briefing personnel involved and the insulation was thoroughly wetted and enclosed in plastic. Personnel then carefully removed the piping sections with insulation intact and placed them in radioactive waste containers for disposal. During this evolution, special precautions taken were: collection of air samples prior to, during and following removal; use of full protective clothing; additional local HEPA ventilation; and full face negative pressure respiratory protection.
- 5.7 Interior dismantlement of the 107 residence first floor was performed on September 28, 1988 and September 29, 1988. Performance of work and handling of waste was in the same manners as previously described, with the exception of leaving the flooring in place to facilitate access and for use as containment during basement dismantlement.
- 5.8 On September 29, 1988 and September 30, 1988, the 107 residence basement interior was dismantled. This included removal of

shelving, paneling, non-structural partitions, piping and fixtures. Waste handling was accomplished by carrying materials up to the first floor and across to the packaging area.

- 5.9 On September 29, 1988, potentially hazardous household waste materials collected during the 107 residence interior dismantlement were inventoried and placed into drums for storage awaiting final disposition.
- 5.10 On September 24, 1988 decontamination and release of furniture removed from the 107 residence was started. Furniture was removed from the temporary storage area on the 105 residence front porch and moved to the Operations Support Facility. Each item was carefully surveyed and contaminated areas identified. Decontamination was accomplished by wiping, washing, brushing, scraping and sanding. Partial disassembly was performed as necessary to gain access to areas of contamination in joints and otherwise inaccessible areas. Following decontamination, each article was resurveyed and additional decontamination performed as required. After final free release surveys were successfully performed and documented, overview surveys were performed by Argonne Natural Laboratory personnel and the item was released to the owners. Furniture decontamination and release was completed on October 6, 1988 with all items successfully released with the exception of a stove, washer, dryer and an upholstered couch. These items were not releasable due to inability to fully survey and decontaminate because of the physical construction.

6.0 WASTE PACKAGING AND DISPOSAL

During the dismantlement of the residence interior, continuous survey to determine radiological status of waste materials was conducted.

Virtually all waste materials were found to be contaminated and were packaged for disposal as radioactive waste. Waste was packaged in B-25 waste containers, fabricated from 10 gauge steel, with an internal waste capacity of 90 cubic feet, an exterior disposal volume of 94.3 cubic feet and with a rubber gasketed lid secured by clips. Total waste

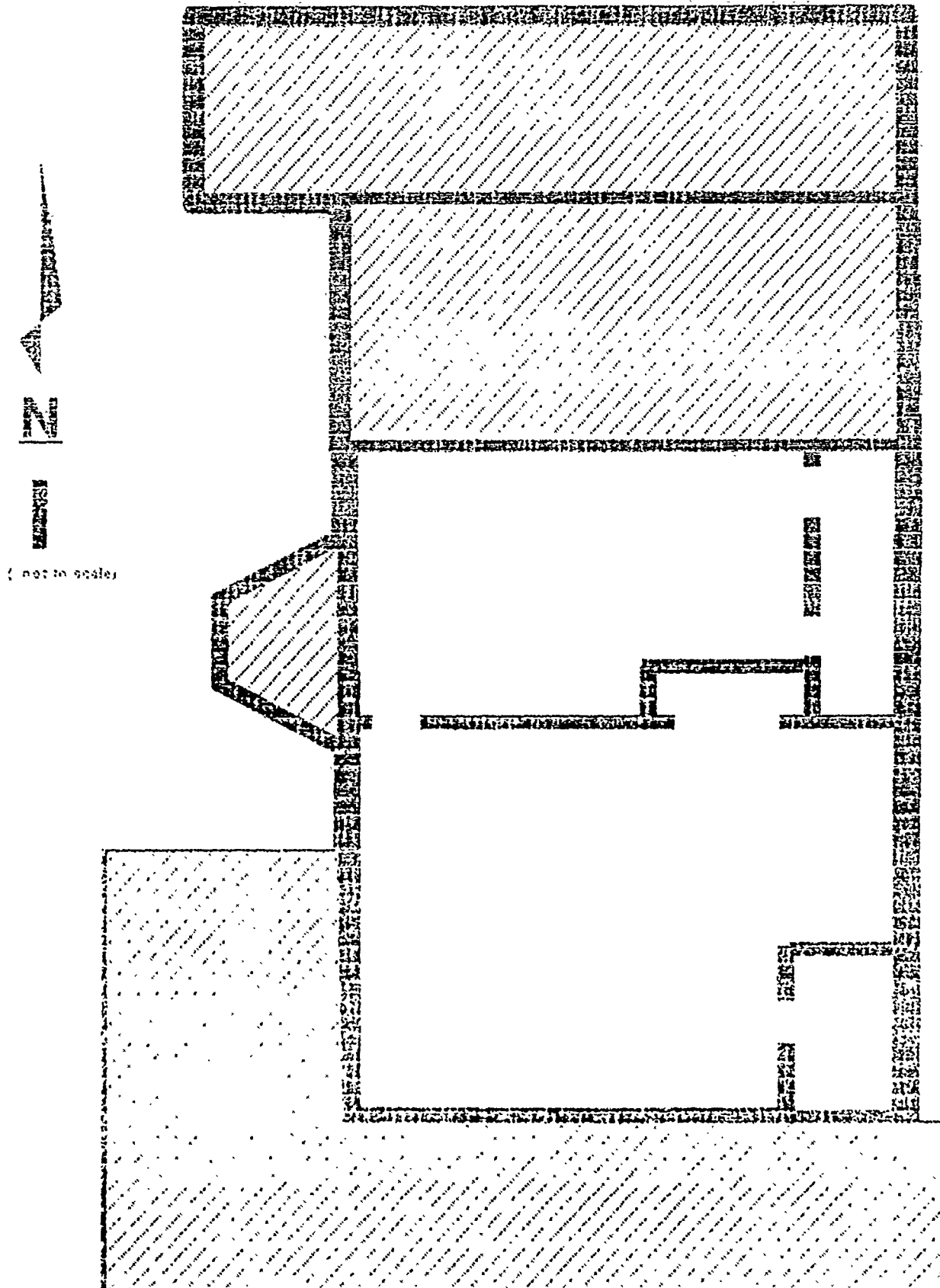
volume generated during this phase was approximately 7,733 cubic feet (114 tons) in 82 B-25 containers plus 4 fifty-five gallon DOT 7A drums. Waste was shipped in 7 shipments to the Envirocare of Utah disposal site near Clive, Utah. Packaged waste weights during this phase were considerably lighter than had been anticipated due to high quantities of light, bulky materials and the resulting decreased packing efficiency.

APPENDIX A

FLOOR PLANS

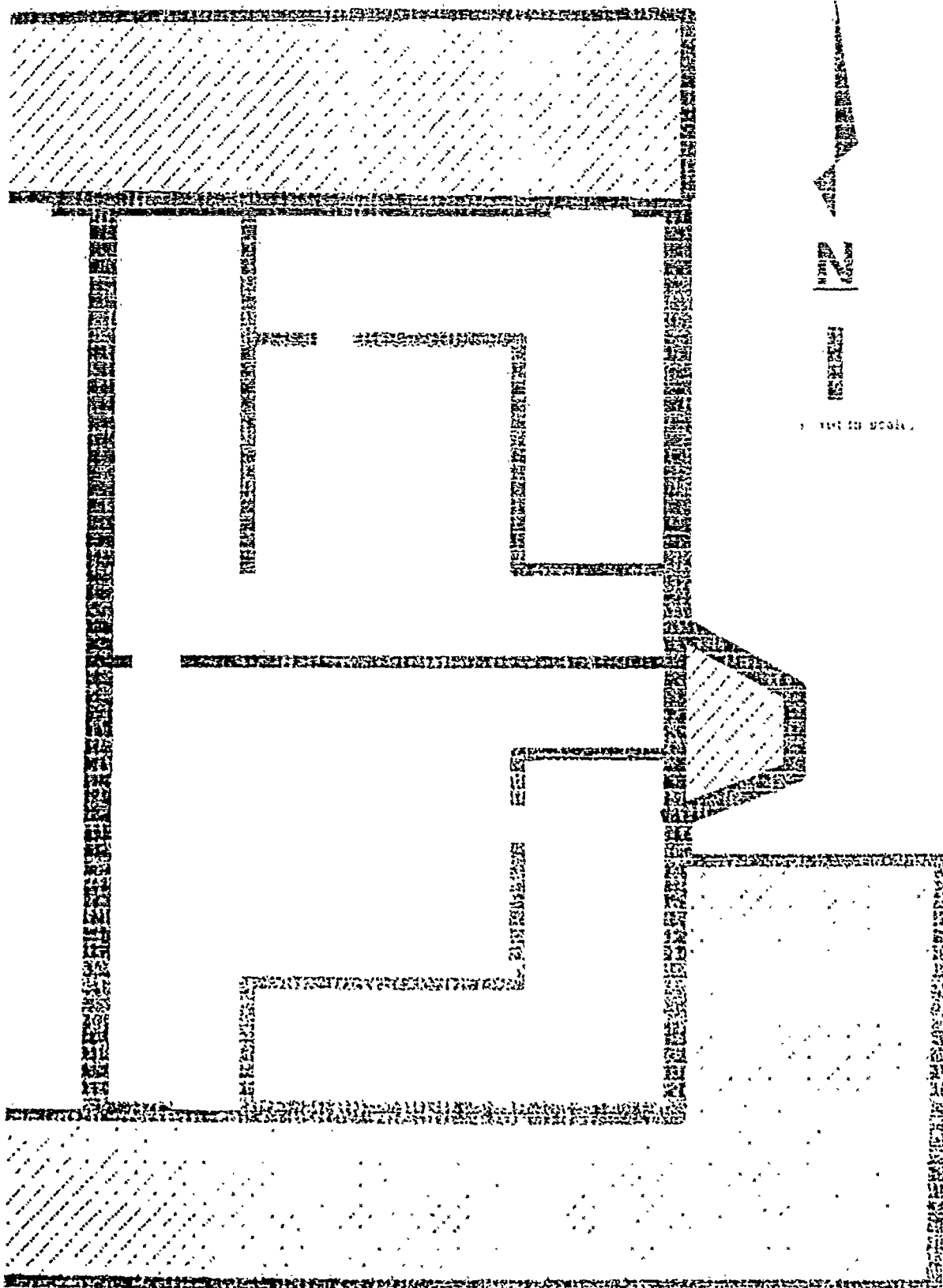
105 East Stratford Avenue

Third Floor



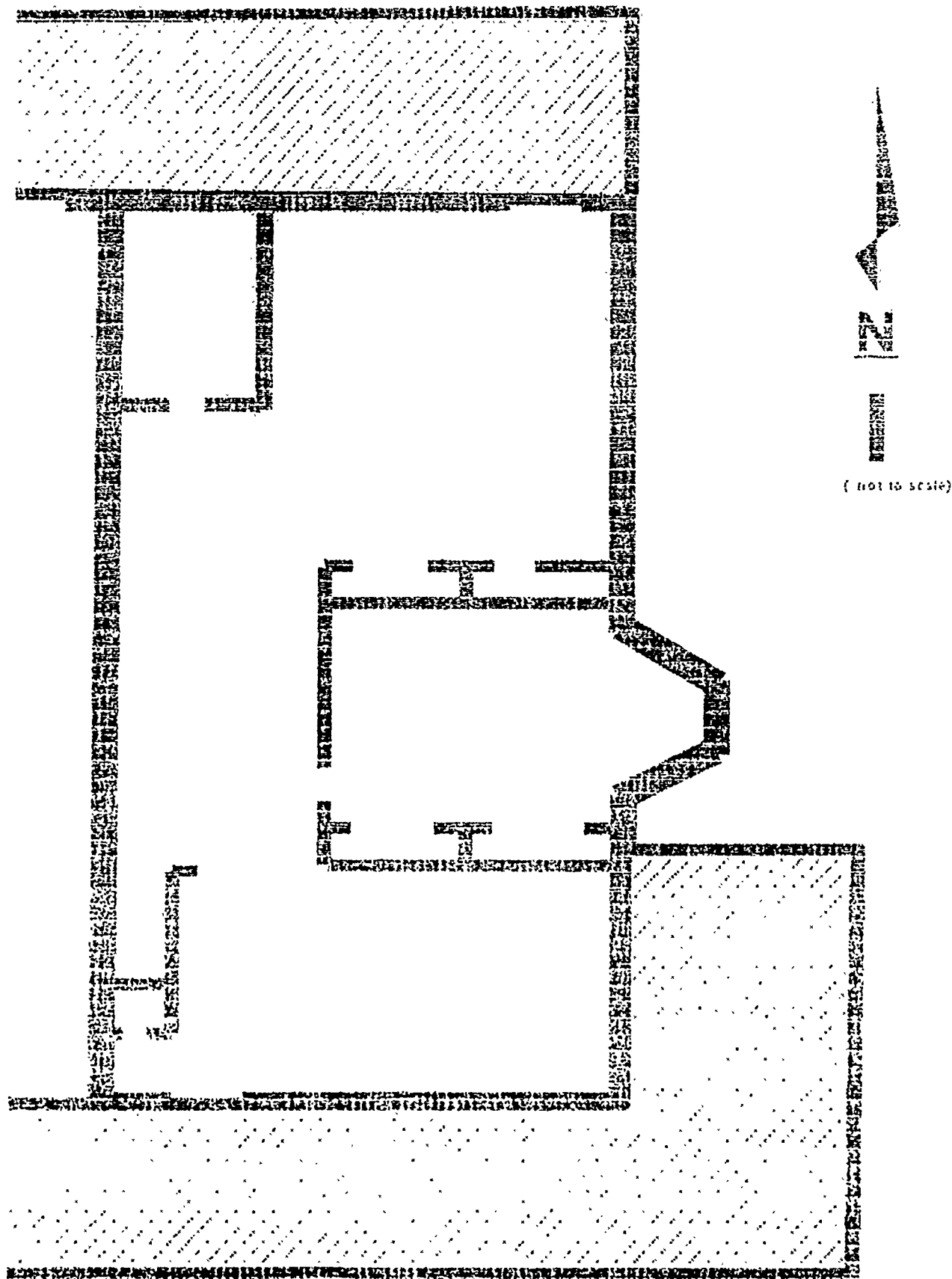
107 East Stratford Avenue

Third Floor



107 East Stratford Avenue

Second Floor



105 East Stratford Avenue

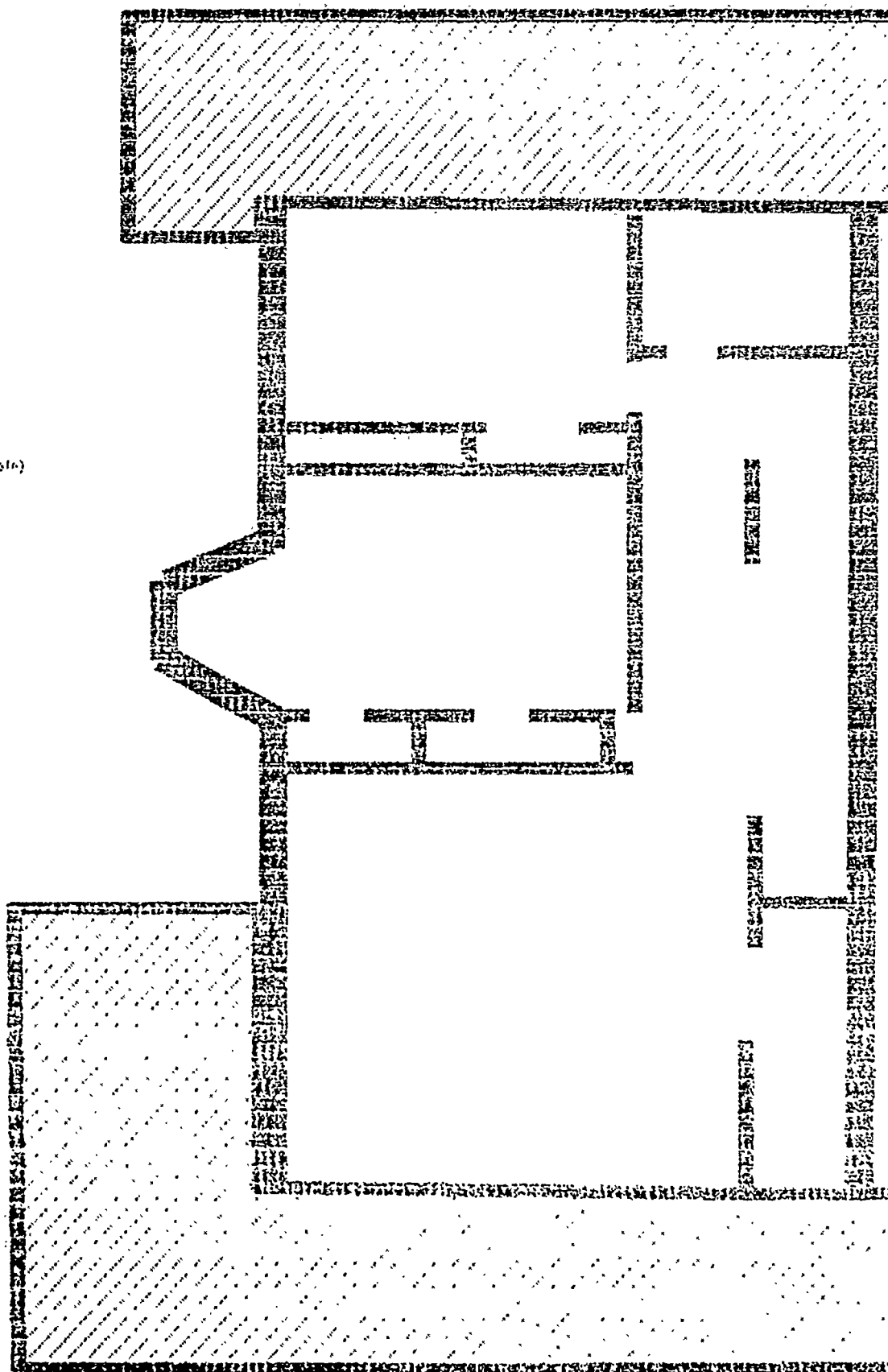
Second Floor



N

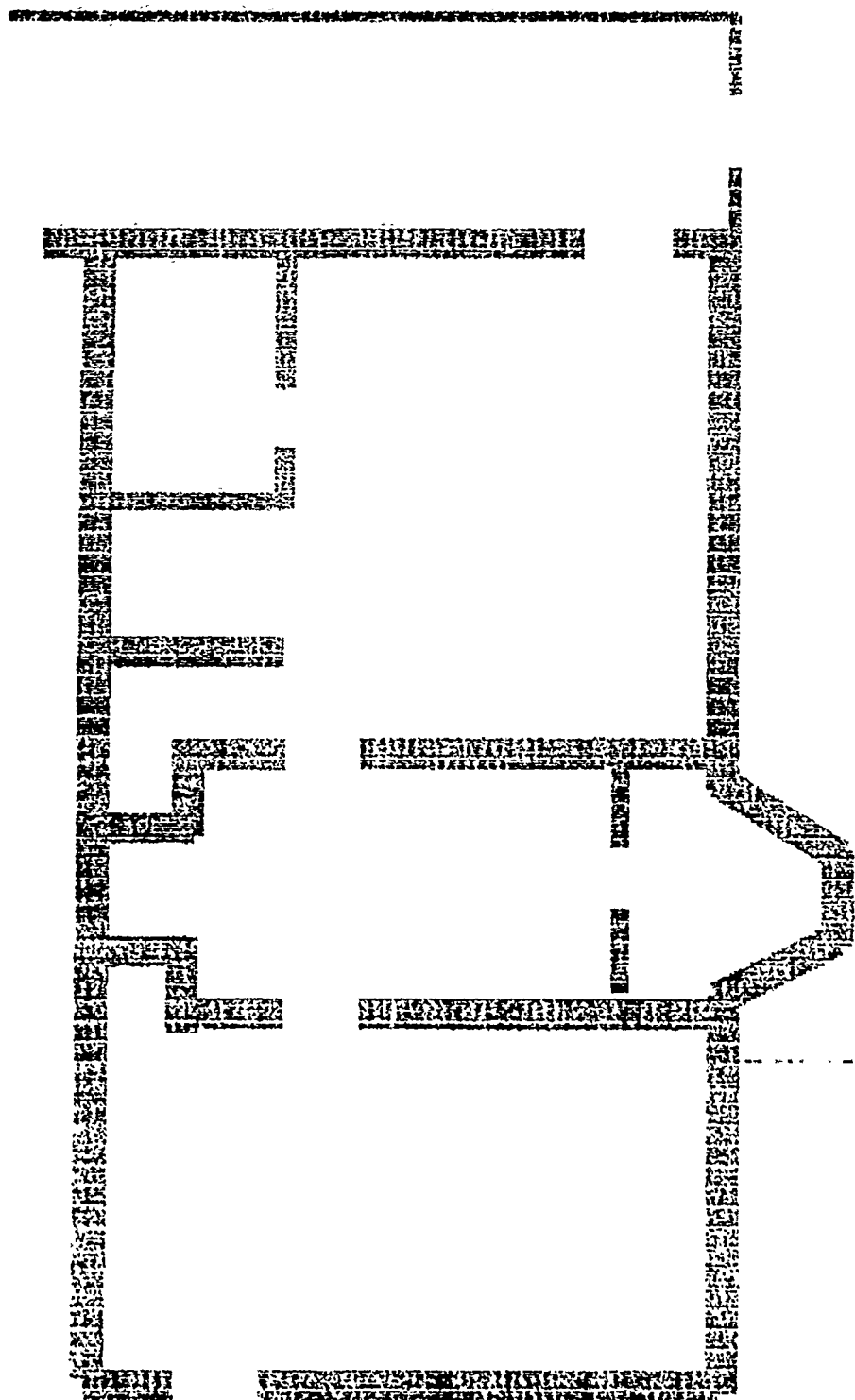
105

(not to scale)



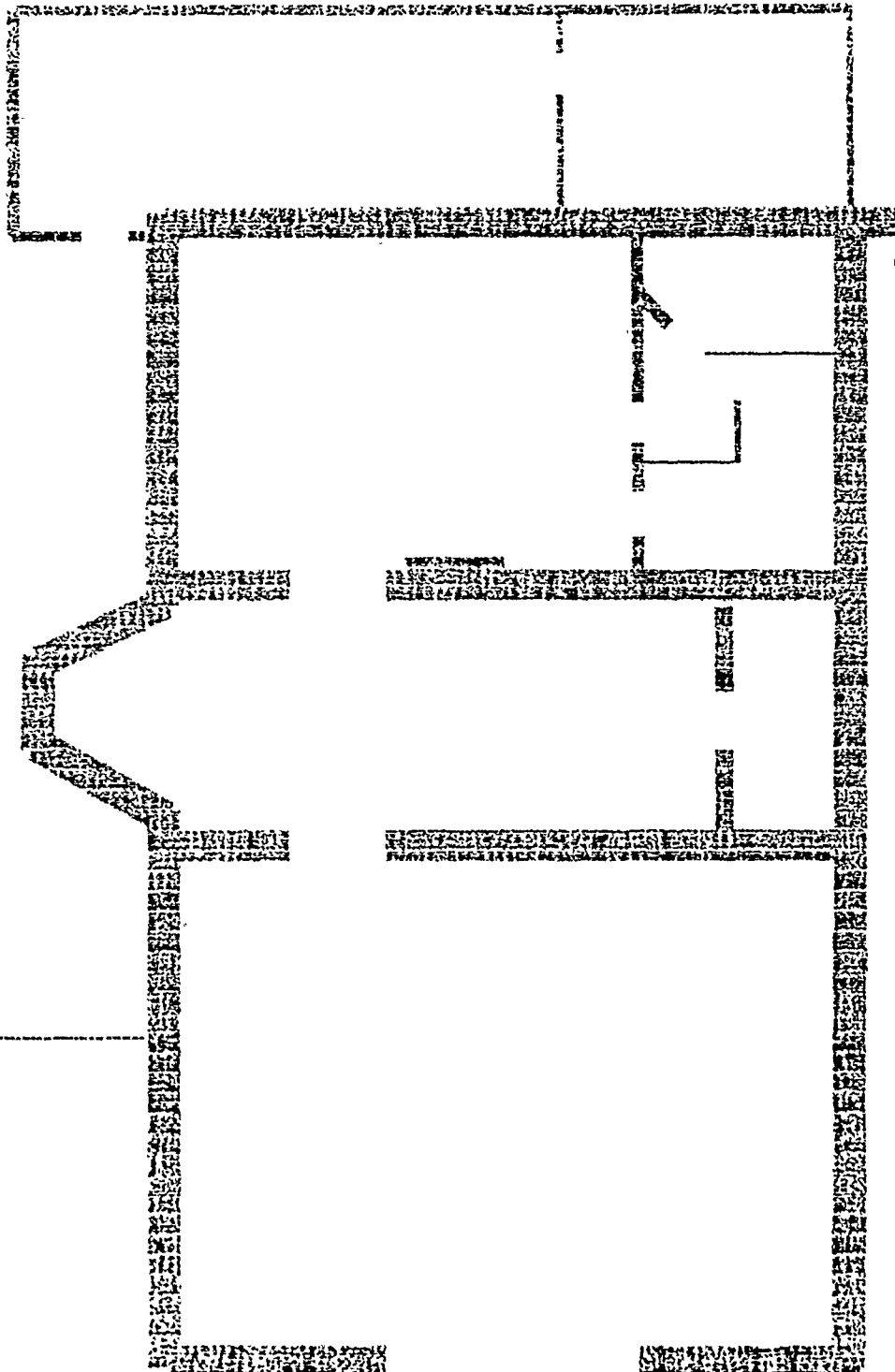
107 East Stratford Avenue

First Floor



100 EAST SYCAMORE AVENUE

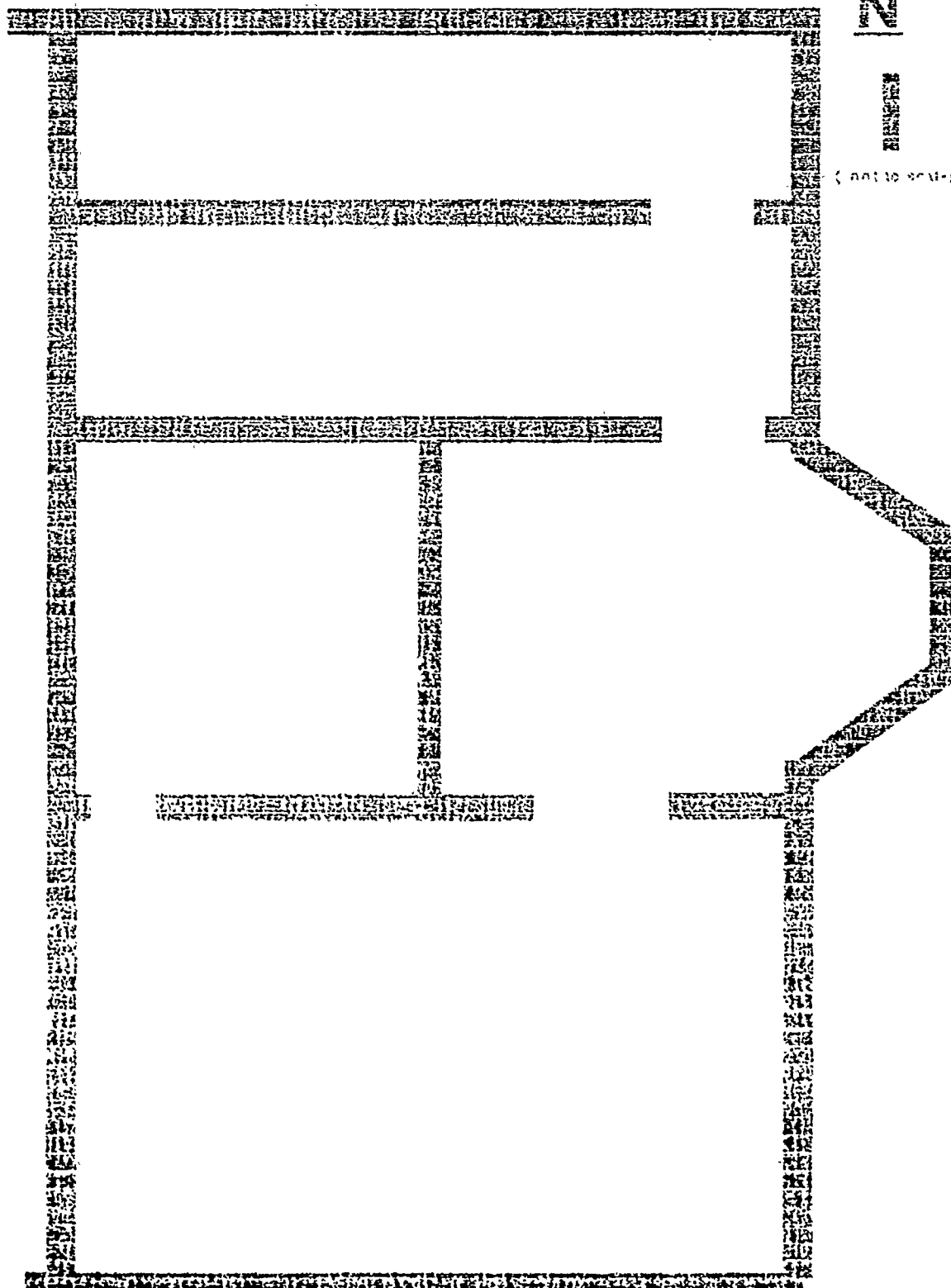
First Floor



(0' 11 1/2" scale)

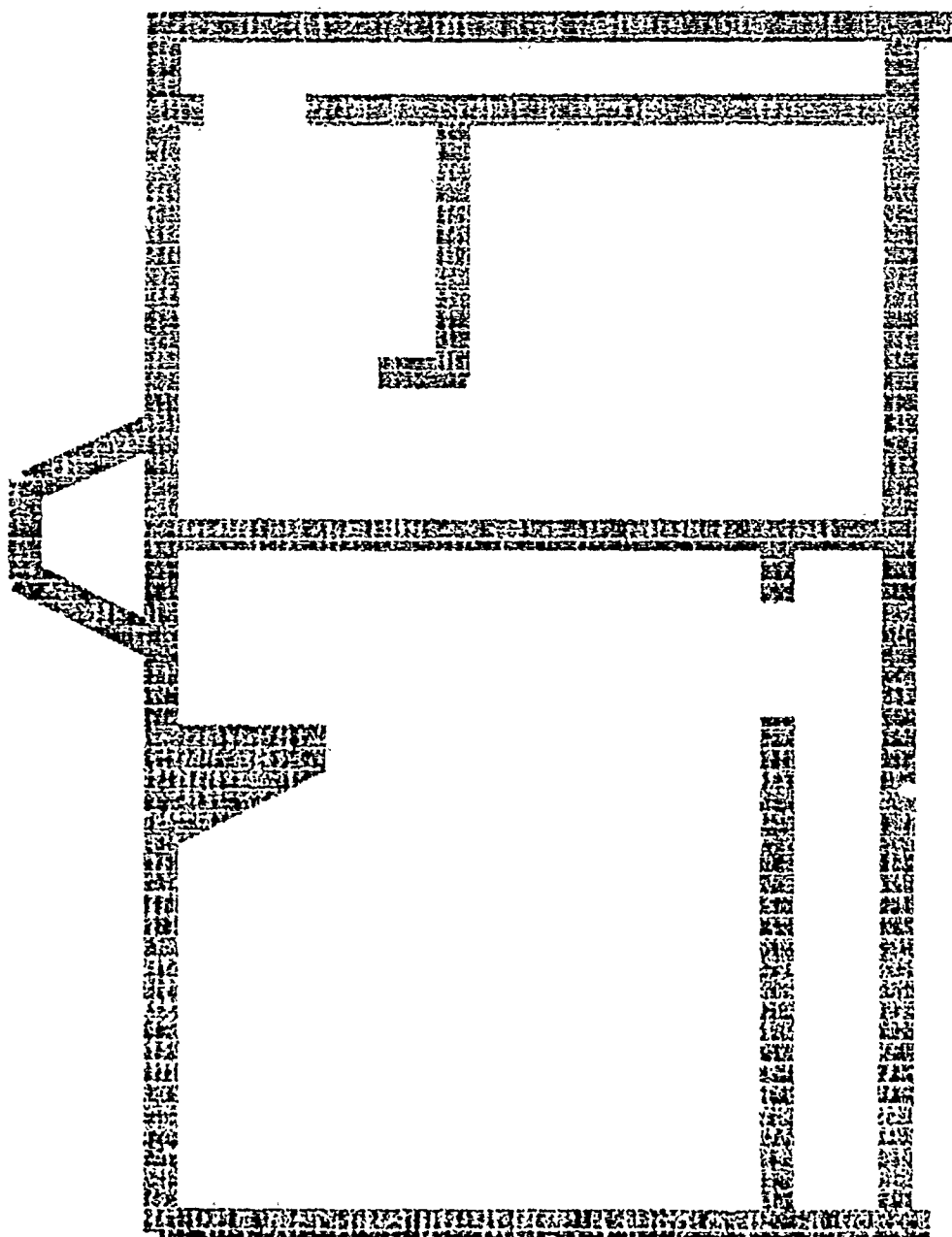
107 East Stratford Avenue

Basement



105 East Stratford Avenue

Basement



(not to scale)



LANSDOWNE

**RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT**

OPERATIONS CLOSEOUT REPORT

CHAPTER 5

***CHEM-NUCLEAR SYSTEMS, INC.
220 STONERIDGE DRIVE
COLUMBIA, SOUTH CAROLINA***

CHAPTER 5 STRUCTURE EXTERIOR DISMANTLEMENT

CHAPTER 5

STRUCTURE EXTERIOR DISMANTLEMENT

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LANSDOWNE RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT

OPERATIONS CLOSEOUT REPORT

CHAPTER 5

STRUCTURE EXTERIOR DISMANTLEMENT

1.0 INTRODUCTION

Dismantlement of the twin residences at 105 and 107 E. Stratford Avenue, Lansdowne, Pennsylvania was accomplished in three phases. The first phase from October 10, 1988 through November 17, 1988 consisted of removal of the upper three floors of the residences, leaving the flooring on the first floor intact to act as weather protection and to serve as part of the containment during basement dismantlement. A second phase, removal of the residence porches to facilitate access for soil excavation, was performed from January 10, 1989 through January 13, 1989. The third and final phase, removal of the basements and foundations, occurred during the February 1, 1989 to February 27, 1989 period. Sequencing in this manner was done to allow excavation of contaminated soil adjacent to the basement walls and foundations prior to their removal.

2.0 PREPARATIONS FOR DISMANTLEMENT

On October 3, 1988 a structural inspection of the residence was performed following dismantlement of interior non-structural components. Results of this inspection showed that the basic structure was physically safe for conduct of exterior dismantlement actions. Detailed radiological surveys were performed to ascertain needs for containment, dust suppression and ventilation. Based upon results of these surveys, it was determined that all areas, with the exception of localized portions of the 105 residence first floor and stairways and the 105 basement could be dismantled utilizing reduced levels of containment. Major portions of the structure

were therefore dismantled using plastic sheeting and tarpaulin covers, with local full containments for hot spot reduction. Use of HEPA filtered ventilation units and personnel respiratory protection were continued throughout dismantlement, with full containment used for the 105 basement.

3.0 METHODS OF DISMANTLEMENT

Dismantlement of the building exterior consisted of manual removal of materials on a piece by piece basis using hand tools. Work progressed in an orderly manner from the residence roofs and third floors downward. Building construction was a composite of stone and mortar (up to 24 inches in thickness), brick and mortar (some exterior and interior walls and the firewall between the residences) and wood frame (some exterior and interior walls, flooring, roofs and porches). The building exterior was of wire mesh and stucco or stucco over stone.

4.0 STRUCTURAL CONCERNS

In general, integrity of the structure during dismantlement was maintained by a top to bottom dismantlement, removing materials in approximately one foot vertical increments. Areas between windows and doors which became free standing by removal of upper courses of material were dismantled as a unit. Of special concern from a structural and safety point of view was the brick fire wall shared by the residences. This was stabilized during dismantlement by bracing to remaining floor joists using wooden structural members from previous dismantling activities.

5.0 SEQUENCE OF DISMANTLEMENT

5.1 FIRST PHASE EXTERIOR DISMANTLEMENT

- 5.1.1 Work was started in dismantlement of the 105 residence roof on October 10, 1988. Working from scaffolding erected on temporary plywood flooring on the 105 third floor joists, personnel removed the slate roof,

underlying materials and then the rafters. Work on this task was completed on October 12, 1988.

- 5.1.2 With roof dismantlement completed on the 105 residence, removal of the 105 third floor walls was started on October 12, 1988. All walls, with the exception of the firewall were completed on October 14, 1988.
- 5.1.3 On October 14, 1988, work was started on removal of the 107 dormers and roof, with dismantlement completed October 19, 1988.
- 5.1.4 Dismantlement of the 107 residence third floor was performed from October 19, 1988 through October 21, 1988. This included removal of all exterior walls and the third floor portion of the fire wall.
- 5.1.5 Upon completion of the 107 third floor, temporary plywood flooring and scaffolding were relocated to the second floor and the second floor firewall braced. The third floor joists and second floor exterior walls of the 107 residence were then dismantled. This was accomplished between October 22, 1988 and October 28, 1988, with the second floor fire wall remaining in place.
- 5.1.6 The next portion of the structure to be dismantled was the 105 residence second floor. Temporary flooring and scaffolding were placed on the second floor, followed by dismantlement of the third floor joists. The removal of the second floor exterior walls and the second floor fire wall was then accomplished. This activity was begun on October 31, 1988 and completed on November 7, 1988.
- 5.1.7 The 107 residence first floor was dismantled during the November 8, 1988 through November 11, 1988 period.

This included removal of all exterior walls, with the flooring left in place to provide containment and weather protection for the basement. After cleaning, plastic sheeting was placed over the flooring and sealed on November 12, 1988.

- 5.1.8 Following removal of the 105 residence front porch ceiling, additional radiological surveys were performed. These surveys showed reduced exposure levels which were indicative of reduced potential for airborne contamination during dismantlement. As a results, the 105 residence front porch roof and walls were removed in an open environment, utilizing water misting for dust abatement. This activity was conducted on November 13, 1988 through November 15, 1988.
- 5.1.9 Initial dismantlement operations for the 105 first floor were conducted in localized HEPA ventilated containments due to elevated exposure levels and increased potential for generation of airborne radiological contamination. Areas remediated in this manner included the stairs, window sills, portions of the interior and exterior walls and portions of the 105 side of the fire wall. Following cleanup, areas were resurveyed and local containments were removed. This occurred from November 11, 1988 through November 15, 1988.
- 5.1.10 After actions to clean up hot spots, general removal of the 105 first floor exterior walls and fire wall was started. Work was started on November 15, 1988 completed on November 18, 1988 with the remaining floor cleaned up and plastic sheeting placed and sealed.

5.2 SECOND PHASE EXTERIOR DISMANTLEMENT

To allow for access to excavate soil adjacent to the residence basements and foundations, the remaining floors of the front and rear porches, pillars, footings and six sets of concrete steps were removed. Exposure levels were determined to be low enough to allow open air dismantlement utilizing water spray for dust abatement. Steps were jackhammered to allow packaging, with all other dismantlement conducted using normal hand tools. Waste materials were loaded directly into waste containers.

5.3 THIRD PHASE EXTERIOR DISMANTLEMENT

5.3.1 On February 1, 1989, following excavation of contaminated soil adjacent to the basement walls and foundations, removal of the 107 residence basement was started. Based upon results of radiological surveys performed for the 107 basement which showed low exposure rates indicating low probability for generation of airborne contamination, dismantlement was performed in an open environment. Water spray was utilized to prevent dust generation. Workers dismantled the remaining flooring and joists, followed by the exterior walls, foundations and columns, then the concrete floor. Removal of the 107 basement, leaving the firewall intact, was completed on February 9, 1989.

5.3.2 Due to elevated levels of radioactive material in the 105 residence basement, full containment was utilized during dismantlement operations. Initially, containment was established over the north portion of the basement and the area of the bay window on the west wall. With HEPA filtered ventilation in place and operational, the exterior, above grade wall of the bay window was removed to allow placement of a waste

container directly into the basement. These preparations were made on February 10, 1989 through February 13, 1989.

5.3.3 During the February 13, 1989 through February 16, 1989 period, the northern section (approximately one third) of the 105 residence basement was removed. Work began with removal of the remaining flooring and joists then progressed to the exterior and interior walls, chimneys and the fire wall. Finally, the basement concrete slab floor was jackhammered and removed.

5.3.4 On February 16, 1989, containment was established over the southern section (approximately one third) of the 105 residence basement and dismantlement started. Work was accomplished in the same manner as the northern section, with all flooring, joists, exterior and interior walls, fire wall and concrete slab floor completed on February 20, 1989.

5.3.5 Removal of the remaining center portion of the 105 residence basement and foundations walls was started on February 22, 1989 and completed on February 27, 1989. Containment, ventilation, conduct of dismantlement and waste handling were conducted in the same manner as previous 105 residence basement removal operations.

6.0 WASTE PACKAGING AND DISPOSAL

6.1 During the first phase of exterior dismantlement, waste materials were surveyed to determine radiological status, with all materials found to be contaminated in excess of the established site criteria. Materials during this phase were carried (or chuted from upper levels) to the first floor of the residence and packaged in radioactive waste containers in the packaging enclosure at the northwest corner of the 105 residence.

- 6.2 Waste materials generated during the second phase exterior dismantlement were also surveyed and found to exceed allowable limits. These materials were loaded directly into waste containers in an open air environment, with water spray utilized for dust suppression.
- 6.3 Waste materials generated during 107 basement dismantlement of the third phase were also packaged in an open environment as radioactive waste. The 105 basement materials, due to higher levels of contamination, were handled and packaged inside containment, with the waste container placed in the work area for loading.
- 6.4 Based on experience gained during initial packaging of dismantlement debris, additional attempts to maximize packaging efficiency during structure exterior dismantlement were made. The primary means to this end were by loading of lighter materials (wood, trash, etc.) into the bottom of the waste container, with denser materials (stone, brick and concrete) loaded on top. Boxes with lighter materials were set aside as necessary until such time as removal of heavier materials to maximize the utilization of this technique.



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**RADIOACTIVE RESIDENCE COMPLEX
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***CHEM-NUCLEAR SYSTEMS, INC.
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COLUMBIA, SOUTH CAROLINA***

CHAPTER 6 REMOVAL OF NON-RESIDENCE STRUCTURES

CHAPTER 6

REMOVAL OF NON-RESIDENCE STRUCTURES

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LANSDOWNE RADIOACTIVE RESIDENCE COMPLEX
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OPERATIONS CLOSEOUT REPORT

CHAPTER 6
REMOVAL OF NON-RESIDENCE STRUCTURES

1.0 INTRODUCTION

Various structures other than the residence at 105 and 107 E. Stratford Avenue, Lansdowne, Pennsylvania were removed during project activities. Many of these structures had been contaminated during radium processing activities. Other structures were removed to obtain access to underlying contaminated soils for remediation. Structures included were the 105 residence garage and associated concrete slabs, the 107 residence garage and concrete slab, a storage shed at the northeast corner of the 107 property, garages and slabs located at 110 and 112 E. Stewart Avenue, driveways for the 105 and 107 residence, and a underground fuel oil tank for the 105 residence. This chapter describes removal and disposition of these structures. General location of these structures is shown in Figure 6 - 1.

2.0 PREPARATIONS FOR DISMANTLEMENT

Prior to start of dismantlement of each structure, detailed radiological surveys were performed. Based upon results of these surveys, appropriate containment, ventilation and dismantlement techniques were selected. Specific methods used will be discussed for each structure in Section 3.0.

3.0 SEQUENCE AND METHODS OF DISMANTLEMENT

- 3.1 The first structure removed was the garage associated with the 105 E. Stratford Avenue residence. Radiological surveys performed on the garage indicated general contamination of the internal structures and contents to an extent that the potential for generation of airborne particulate was high. As a result, removal of internal items was conducted using the garage exterior as containment, with a 1000 cubic foot per minute HEPA filtered ventilation system in operation. The containment and ventilation systems were also utilized during scabbing of hot spots on the floor to reduce high levels of contamination. With the highly contaminated materials removed from the garage interior, additional radiological surveys were performed and results indicated that exterior dismantlement could be conducted utilizing a tarpaulin cover rather than full containment. Preparations for garage dismantlement were made on October 1, 1988, removal of contents from October 3, 1988 through October 6, 1988 and dismantlement of the exterior on October 7, 1988 and October 8, 1988.
- 3.2 Removal of the 105 residence garage concrete slab floor and footers and an adjacent patio slab was conducted November 19, 1988 through November 22, 1988 in preparation for start of soil excavation. Removal was accomplished by jackhammering of the material and loading directly into waste containers by hand and using a backhoe. This work was done in an open air environment, using water spray for dust abatement.
- 3.3 On January 13, 1989, the small storage shed at the northeast corner of the 107 E. Stratford Avenue property was removed to provide access for soil excavation. Removal of contents (scrap lumber, firewood and trash) and dismantlement of the structure was performed in an open air environment.
- 3.4 Dismantlement of the 107 E. Stratford Avenue garage was performed during the February 22, 1989 through February 25, 1989 period.

Removal of contents and the structure was conducted without containment due to the low potential for airborne.

- 3.5 Removal of the 107 E. Stratford Avenue garage concrete slab floor and footers was performed from February 27, 1989 through March 1, 1989, also without containment. The structure was broken up using jackhammers and loaded directly into waste containers.
- 3.6 Removal of the 107 E. Stratford Avenue asphalt driveway was performed from March 1, 1989 through March 10, 1989 in conjunction with excavation of underlying contaminated soil. The asphalt was excavated using heavy equipment and placed directly into waste containers.
- 3.7 The driveway at 105 E. Stratford Avenue was removed on March 20, 1989 through March 22, 1989 prior to excavation of underlying soil. The concrete was broken up and excavated using heavy equipment and placed directly into waste containers.
- 3.8 An underground fuel oil storage tank, approximately four feet in diameter and eight feet long was excavated on March 31, 1989. Following radiological surveys showing the exterior to the tank to be contaminated in excess of the site criteria, the tank was sectioned using an impact hammer and cutting bit, crushed using heavy equipment and packaged as radioactive waste on April 11, 1989.
- 3.9 Radiological surveys of the garage at 110 E. Stratford Avenue indicated that the structure was not contaminated. Due to the presence of deep deposits of contaminated soil immediately adjacent to the structure, a high probability of contaminated soil under the structure, and poor structural condition, however, a decision was reached to remove the structure. On April 19, 1989 the building was razed using heavy equipment.
- 3.10 The garage at 112 E. Stewart Avenue was found to have general radiological contamination in excess of site criteria, but of low

enough levels that generation of airborne was not probable. As a result, the garage was dismantled, using manual techniques and hand tools on April 19, 1989 through April 21, 1989.

- 3.11 Removal of contaminated portions of concrete slabs for the 110 and 112 E. Stewart Avenue garages was conducted as a part of soil excavation. The remaining uncontaminated portions were removed to allow for excavation for new garage foundation preparation and construction. At the request of the U.S. Army Corps of Engineers, additional radiological surveys were performed and clean rubble buried in deep excavations as part of backfill.
- 3.12 The 110 and 112 E. Stewart Avenue driveways, sidewalk sections and street aprons which were not contaminated, but had been damaged during project activities were removed during the period from June 22, 1989 through July 8, 1989. This was done in conjunction with excavation for replacement driveways, with clean waste materials removed for disposal by the driveway subcontractor.

4.0 WASTE PACKAGING AND DISPOSAL

- 4.1 All materials removed during dismantlement of non-residential structures were surveyed to determine radiological status. All materials exhibiting contamination in excess of site criteria were packaged as radioactive waste.
- 4.2 Waste materials removed from the 105 E. Stratford residence garage exhibited high levels of contamination and were packaged in containment to prevent generation of airborne radioactive contamination. Contaminated materials removed from all other structures were packaged in an open environment using water spray to prevent dust.
- 4.3 Waste materials generated during demolition of the 110 E. Stewart Avenue garage, although not contaminated, were disposed of as

radioactive waste at the request of the U.S. Army Corps of Engineers. This was requested due to the low total tonnage involved and the lower cost involved.

- 4.4 Uncontaminated concrete materials resulting from demolition of the 110 and 112 E. Stewart Avenue garage slabs and foundations were placed in deep excavations, choked with soil and compacted in place at the request of the U.S. Army Corps of Engineers.
- 4.5 Uncontaminated concrete wastes generated by removal of the 110 and 112 E. Stewart Avenue driveways, sidewalks and aprons were disposed of by the driveway subcontractor.
- 4.6 In order to best achieve good packaging efficiency, lighter materials were placed in the waste container first, followed by heavier materials on top.
- 4.7 In accordance with contract requirements and to the extent possible, rubble was segregated from soil during the packaging process.
- 4.8 Final waste volumes of rubble removed are addressed in Chapter 9.

UNION AVENUE

Figure 6-1
Non-Residential Structure
6-8



112 STEWART
GARAGE

112 STEWART
GARAGE

107 E. STRATFORD
GARAGE SHED

105 E. STRATFORD
GARAGE

CAM STATION # 3

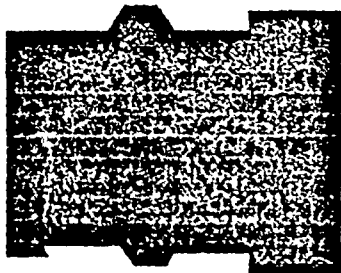
CAM STATION # 2

CAM STATION # 4

EAST STRATFORD AVENUE

MAPLE
AVENUE

CAM STATION # 1





LANSDOWNE

**RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT**

OPERATIONS CLOSEOUT REPORT

***CHEM-NUCLEAR SYSTEMS, INC.
220 STONERIDGE DRIVE
COLUMBIA, SOUTH CAROLINA***

CHAPTER 7 SOIL EXCAVATION

7-1

CHAPTER 7

SOIL EXCAVATION

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LANSDOWNE RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT

OPERATIONS CLOSEOUT REPORT

CHAPTER 7
SOIL EXCAVATION

1.0 INTRODUCTION

Excavation of contaminated soil from the project site constituted the longest duration task of the project, from commencement of intensive soil surveys on November 15, 1988 through final verification soil sampling on June 11, 1989. Actual soil excavation spanned the period from November 19, 1988 through May 8, 1989. Conduct of soil excavation required close coordination of activities and careful planning to assure that areas were available for excavation in a timely manner. Total quantities of soil excavated of over 4,100 tons were over four times the anticipated 1000 tons. The final extent of soil removal included not only the 105 and 107 E. Stratford Avenue properties, but also those at 99 and 115 E. Stratford Avenue, 110, 112 and 114 E. Stratford Avenue and 60 N. Union Avenue. In places, excavation was required to depths of eleven feet below grade. A general area extent excavation is shown in Figure 7-1.

This chapter describes the general methods and sequence followed for soil remediation. Detailed radiological aspects, as covered by the Radiological Closeout Report are not addressed. The sequence of excavation is described by area rather than on a grid by grid level of detail. Excavation of soil associated with sewer remediation is addressed in Chapter 8.

2.0 PREPARATIONS

- 2.1 Prior to start of soil excavation, site personnel obtained stadia measurements for accessible areas of the site. With the exception of areas covered by structures, these measurements were provided to Catania Engineering Associates, Inc. for conversion into a baseline topographical map. This map is provided as drawing 83037, Sheet 1 of 3.
- 2.2 Detailed grid by grid radiological surveys were performed for each area prior to excavation. This was accomplished to define the areas requiring remediation and to guide initial excavation activities. Results of these surveys were provided to the U.S. Army Corps of Engineers prior to start of excavation for each grid.
- 2.3 To evaluate excavation control methodologies utilized by Chem-Nuclear Systems, Inc. and to investigate a potential alternate method of evaluation of depth and extent of contamination, a special joint effort was conducted by the U.S. Army Corps of Engineers and Argonne National Laboratory. Prior to start of soil excavation, personnel from these organizations performed a subsurface gamma survey of a selected test area, approximately twenty by sixty feet. Sections of electrical conduit were driven into the soil over the test area and radiological survey data obtained incrementally over the depth of the conduits. This survey was performed during the week of November 14, 1988. Results of this survey were retained by the U.S. Army Corps of Engineers for comparison to as excavated contours (see Section 4.3). In addition to the subsurface soil survey performed prior to start of excavation, additional surveys were performed in conjunction with determination of final scope of effort as discussed in Sections 4.6 and 4.13.

3.0 SOIL EXCAVATION METHODS

- 3.1 Following initial surveys, bulk removal of contaminated soil was accomplished utilizing heavy equipment, guided by ongoing survey and sampling actions. For initial excavation as well as areas where access was restricted, a John Deere Model 410 tractor/backhoe was utilized. This unit, equipped with a .5 cubic yard bucket and straight cutting edge, excavated soil and loaded it directly into the waste containers. In accessible areas, a larger Poclain MD-80 track excavator equipped with a .75 cubic yard bucket and straight cutting edge was used. This unit was responsible for removal of the majority of contaminated soil. On occasion, an Allis-Chalmers Model AC7 track front end loader was utilized in support of excavation, primarily to transport soil from the excavation area to the packaging area.
- 3.2 Following bulk removal of contaminated soil, cleanup and removal of small, localized hot spots was performed using manual labor.
- 3.3 During excavation, any soils found to be uncontaminated were set aside in a clean area or on plastic to allow reuse at a later time for backfill.
- 3.4 Due to periods of wet weather during the excavation process, some deviations from planned activity areas were required to allow for drying.

4.0 SEQUENCE OF EXCAVATION

- 4.1 On November, 19, 1988, the first excavation of contaminated soil was performed. This consisted of a small, approximately two foot wide, four foot long by four and one half foot deep excavation to allow hookup to the potable water line at the front end of the 105 E. Stratford Avenue property. All excavation was performed manually, with soil placed directly into the waste container. During this excavation, contamination was noted in the upper

layer, approximately 18 inches, with an underlying layer of clean soil. As excavation progressed, contaminated soil was again encountered beneath the potable water line in the area of the sewer lateral. No attempt was made to clean up the adjacent soil at this time. Following tie in to the potable water line and flushing, the excavation was partially backfilled with excavated soil.

- 4.2 On November 22, 1988, excavation was started at the northwest corner of the 105 property, in the area previously occupied by the garage and patio slabs. This area, bounded to the north and west by the perimeter fence, to the south by the 105 driveway slab and to the east by the test area, was worked until December 3, 1988 (with time off for the Thanksgiving holiday period).
- 4.3 During the period from December 5, 1988 through December 10, 1989, the designated U.S. Army Corps of Engineers/Argonne National Laboratory test area was excavated. This area was located along the rear of the property, spanning the 105/107 property line in the area which was between the two garages. Upon completion of excavation, a comparison was made between actual, as excavated soil volumes and contours and those predicted by the subsurface study, with very close agreement of results.
- 4.4 The next area to be excavated was the section between the test area and the residence basements, bounded on the east by the 107 residence driveway and on the west by the 105 residence driveway. This area was worked December 10, 1988 through December 12, 1988. During this phase, the Poclain excavator was placed into service.
- 4.5 During the period of December 13, 1988 through December 21, 1988, the excavation activity was focused on the west side of the 105 property, working from north to south. During the course of excavation in this area, two large trees, a walnut and a

Norwegian maple were removed by Eagle Tree Service to allow access to underlying contaminated soil. Following removal of the above ground portions, the stumps and major root systems were excavated. Contamination of these was identified due to the surrounding soil, and the stumps were size reduced and packaged as radioactive waste.

- 4.6 In an effort to better estimate the final volume of soil to be excavated, Argonne National Laboratory personnel, assisted by labor supplied by Chem-Nuclear Systems, Inc. performed additional subsurface soil surveys. Based on results, an estimated volume of 1053 tons (in excess of the 1150) was projected. These surveys were conducted during the December 12, 1988 through December 15, 1988 period.
- 4.7 On December 16, 1988, Chem-Nuclear Systems, Inc. excavated soil in excess of the contract base scope of 1000 tons. The U.S. Army Corps of Engineers was notified in writing as required.
- 4.8 On December 19, 1988, the contract allowable overage of +15% (1150 tons) was exceeded and the U.S. Army Corps of Engineers again notified in writing as required.
- 4.9 Following the Christmas and New Year holiday period, work was begun along the north perimeter of the project site. From January 3, 1989 through January 7, 1989, excavation progressed from the 110 E. Stewart Avenue property across the 112, and 114 E. Stewart Avenue properties. Although it was known that additional deep deposits of contaminated soil existed adjacent to the 110 and 112 E. Stewart Avenue garages, excavation in these areas was deferred until a later date, pending further surveys and disposition of the garages.
- 4.10 From January 14, 1989 through January 15, 1989 and January 18, 1989 through January 21, 1989, excavation was conducted on adjacent properties at 60 N. Union Avenue and 115 E. Stratford Avenue, the narrow strip between the 107 residence driveway and

the basement/foundation and the northeast corner of the 107 property.

- 4.11 The front yard areas between the 105 and 107 residence driveways with the exception of the sewer laterals was excavated on January 16 and January 17, 1989 and January 25 through January 31, 1989. The sewer laterals were not excavated to allow access across the front yard during basement and foundation removal.
- 4.12 On January 23, 1989 through January 25, 1989 the remaining contaminated areas east of the 107 driveway were excavated. The driveway was left in place to facilitate access for material handling.
- 4.13 Due to continued increases in the volumes of soil being excavated, an additional effort was made to forecast remaining volumes of contaminated soil by Argonne National Laboratory. Based upon additional field survey data and correlation of previous data to actual experience obtained during excavation, a new out of scope (greater than 1150 tons) estimate of 3053 tons was derived.
- 4.14 Following dismantlement and removal of the residence basements and the 107 residence garage and driveway, excavation was restarted on March 1, 1989. The first areas worked were the areas beneath the 107 garage and the driveway, working from north to south. These areas were completed on March 10, 1989.
- 4.15 The next area of excavation was the cavity under the residence basements, from March 11, 1989 through March 17, 1989. The 107 basement area was excavated first, followed by the 105 basement area. In conjunction with this excavation, residual foundation was removed.
- 4.16 Excavation of the 105 residence driveway area was conducted during the March 19, 1989 through April 12, 1989 period. Work again progressed in a north to south manner. During this period,

the underground fuel oil storage tank was removed and surrounding soil remediated.

- 4.17 On April 19, 1989, following removal of the garages at 110 and 112 E. Stewart Avenue, excavation was begun in this area. During the course of excavation, a stone walled basement structure was unearthed, with the tops of the walls approximately two feet below grade. The walls continued to a depth of approximately eleven feet below grade. The cavity formed by these walls had been filled with residential garbage and quantities of ash like material. Following excavation of these materials, which were contaminated either when originally deposited or by washing of contamination down from overlaying soils, the area was verified clean. The remaining walls were left in place and backfill conducted. Excavation of the 110 and 112 E. Stewart garage areas was completed on April 26, 1989.
- 4.18 The final areas of contaminated soil excavation were remaining areas along E. Stratford Avenue, which had been previously inaccessible due to location of administrative facilities. These areas included median strips between sidewalks and curbs, areas under sidewalks and small hot spots located on asphalt surfaces. Cleanup of these areas was conducted from April 25, 1989 through May 8, 1989, followed by final surveys and release of the site from radiological control.
- 4.19 Following completion of soil excavation, an as excavated contour map was prepared by Catania Engineering Associates, Inc. and is provided as Drawing 83037, Sheet 1 of 1, dated May 31, 1989.

5.0 WASTE PACKAGING AND DISPOSAL

- 5.1 During excavation of soil, all contaminated materials were placed directly into waste containers. Any clean soil was set aside for later placement during backfilling.

- 5.2 As soil was placed into the waste container, it was compacted using a pneumatic tamper and the bucket of the excavation equipment to attain the maximum waste loading. Each container was compacted in several lifts to assure thorough compaction.
- 5.3 Handling of filled waste containers on site was by utilization of a Monitor rough terrain, 12,000 pound capacity fork truck. This unit moved the filled container to the controlled area boundary (normally the OSF).
- 5.4 Handling of filled waste containers outside of the controlled area was accomplished with a Caterpillar Model V-150, 12,000 pound capacity fork truck. This unit transported the units from the controlled area to be weighed, surveyed, stored and loaded for transport.
- 5.5 Final waste volumes of contaminated soil are addressed in Chapter 9.



NOT TO SCALE

AREAS OF REMEDIAL ACTION

UNION AVENUE

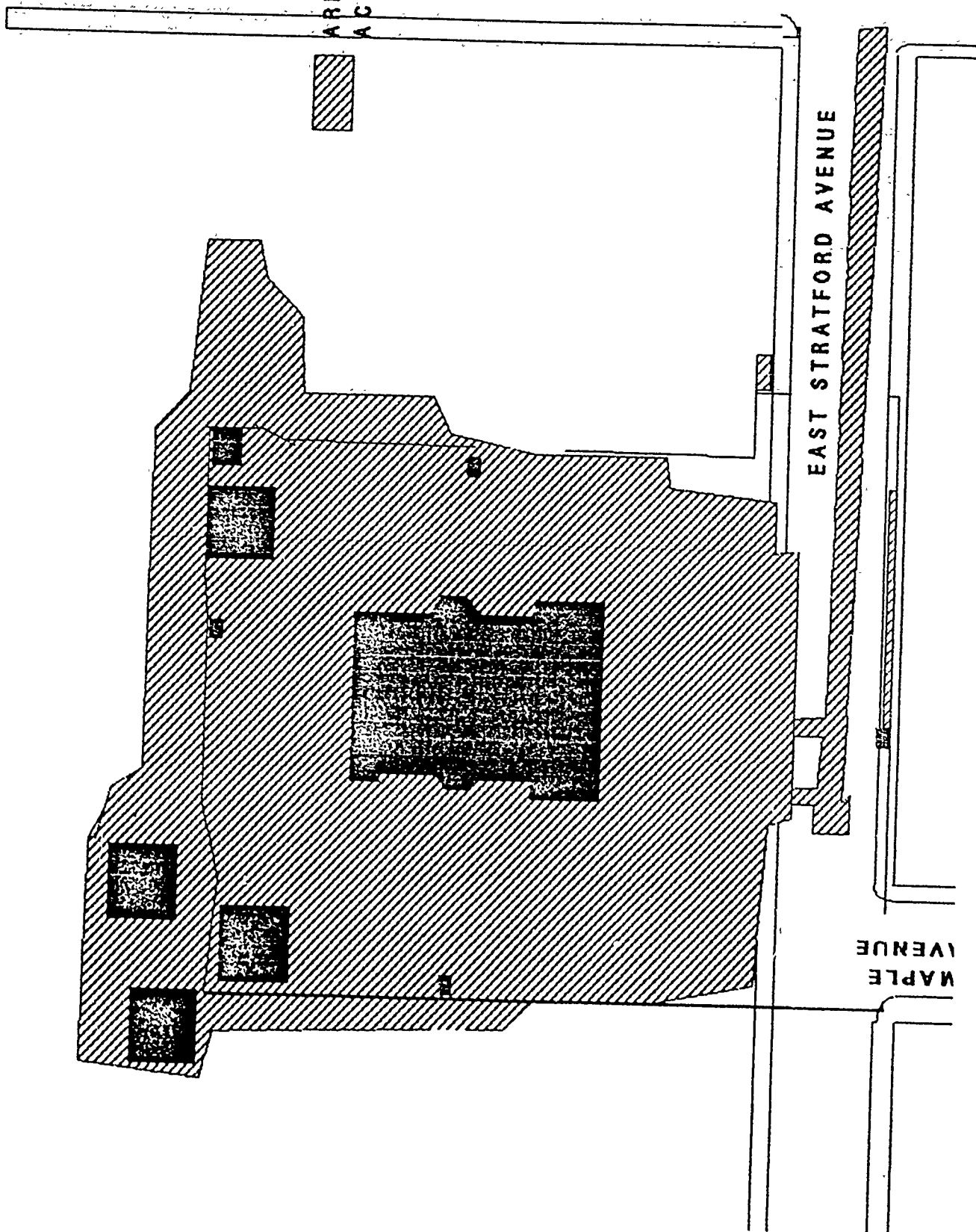
Figure 7-1

Extent of contaminated soil excavation

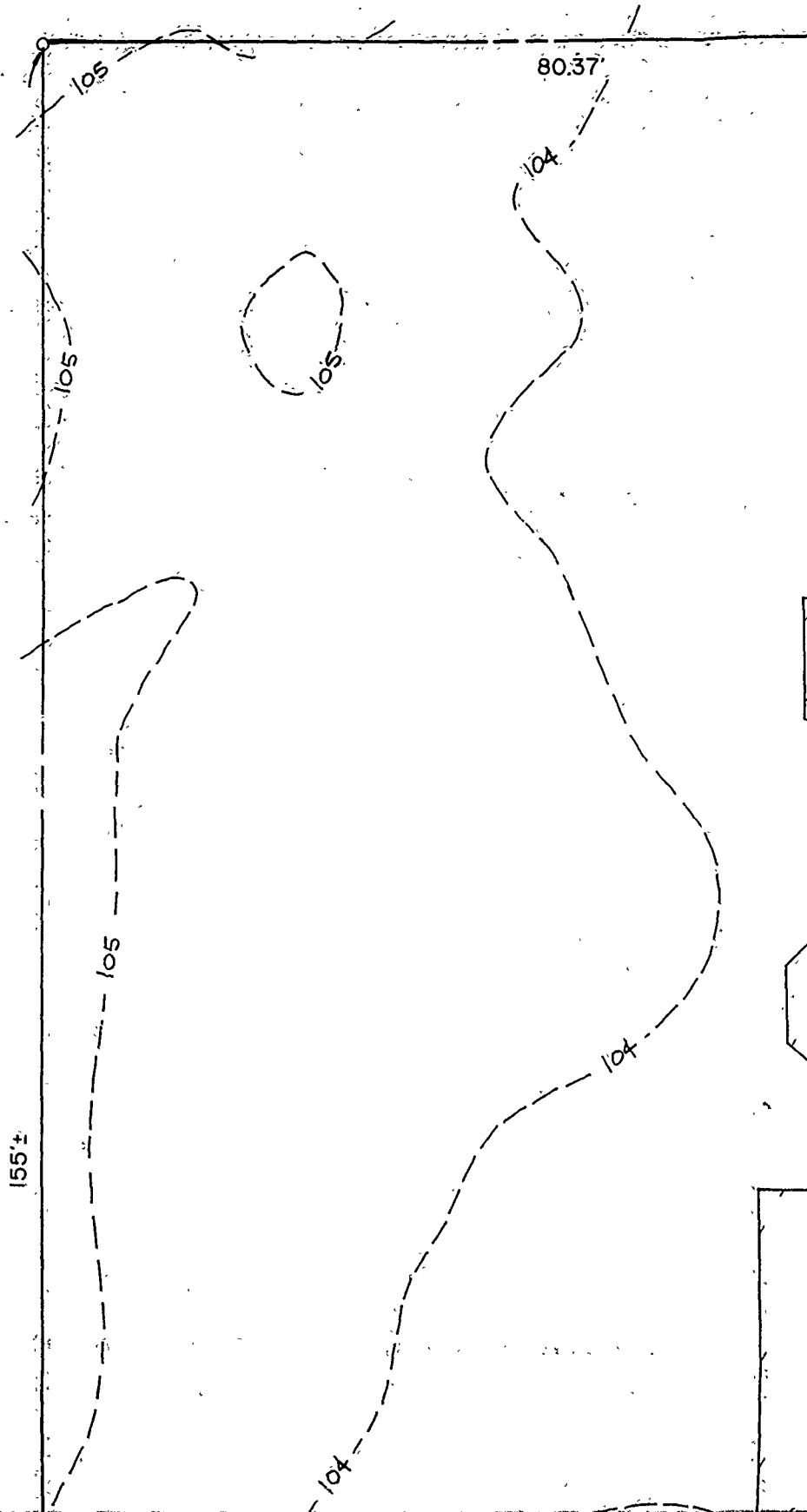
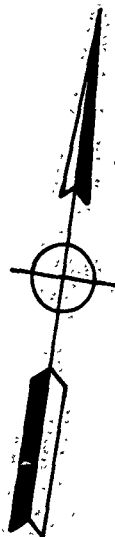
7-11

EAST STRATFORD AVENUE

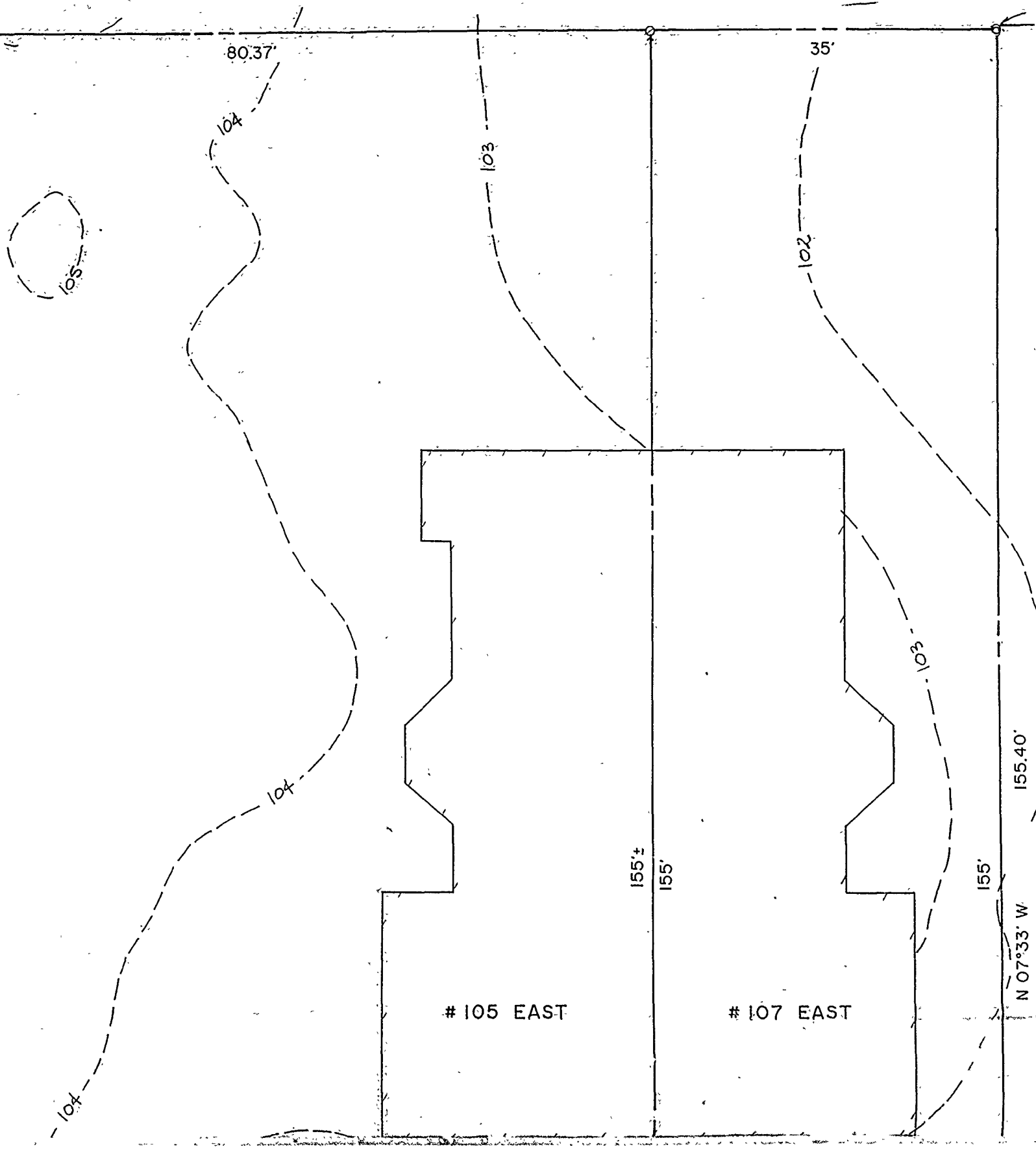
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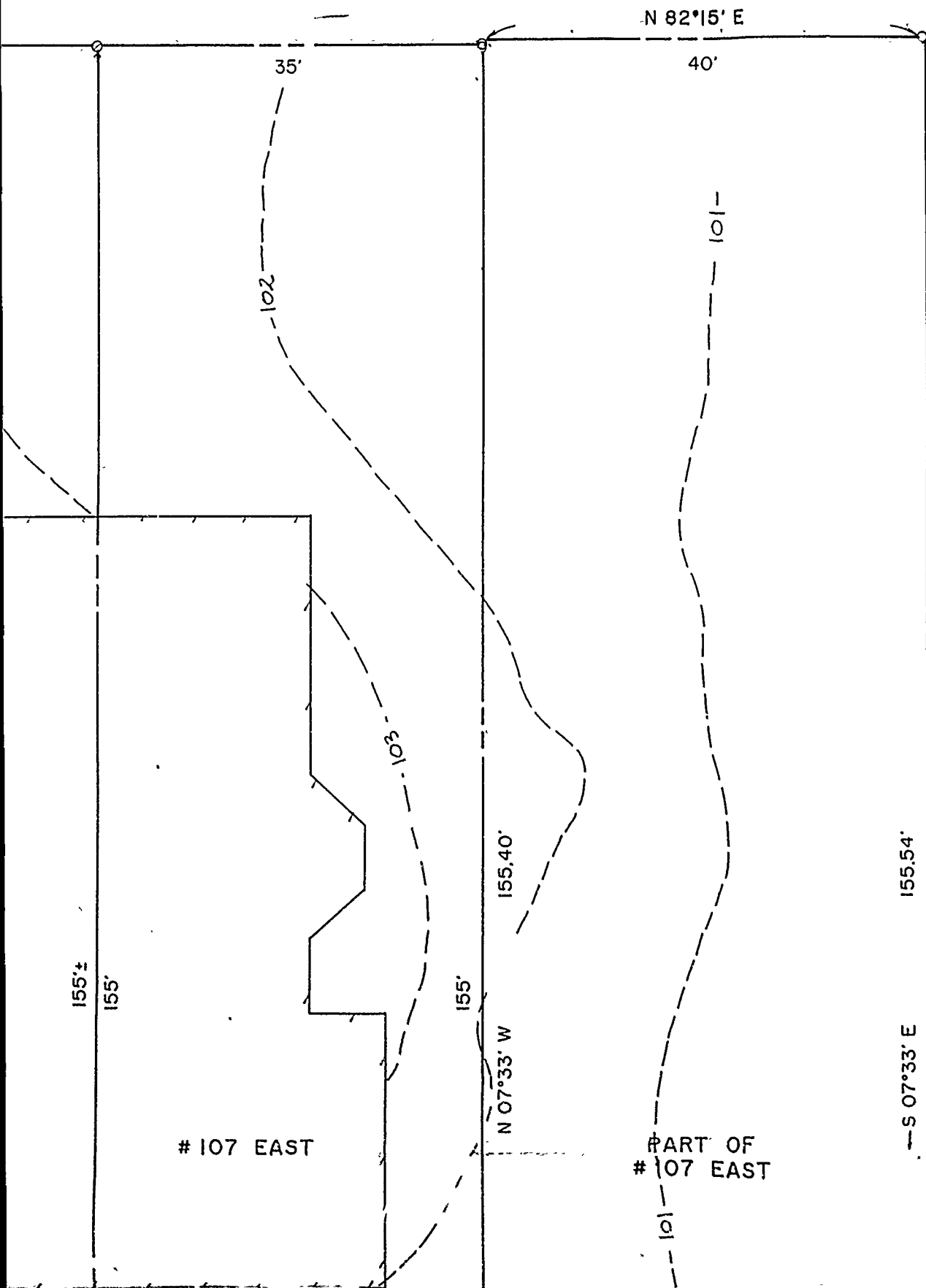
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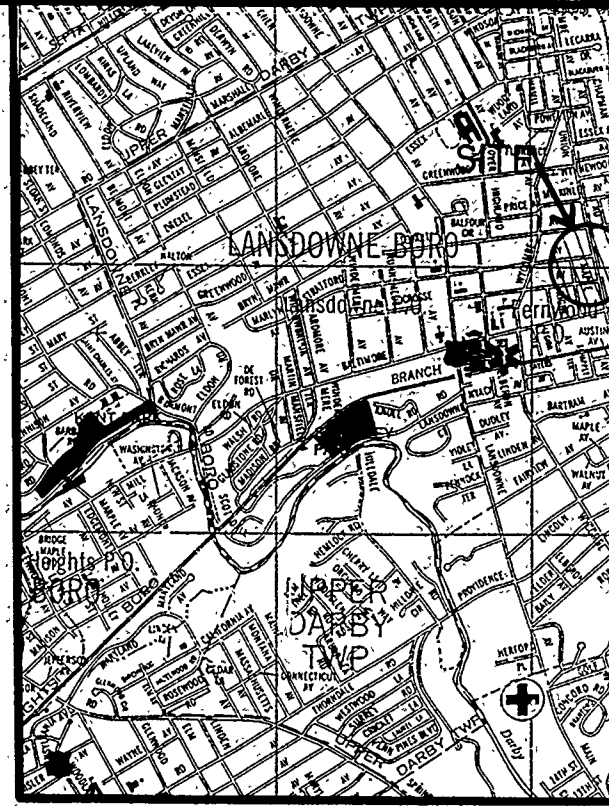
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OF
AST

AVENUE

E

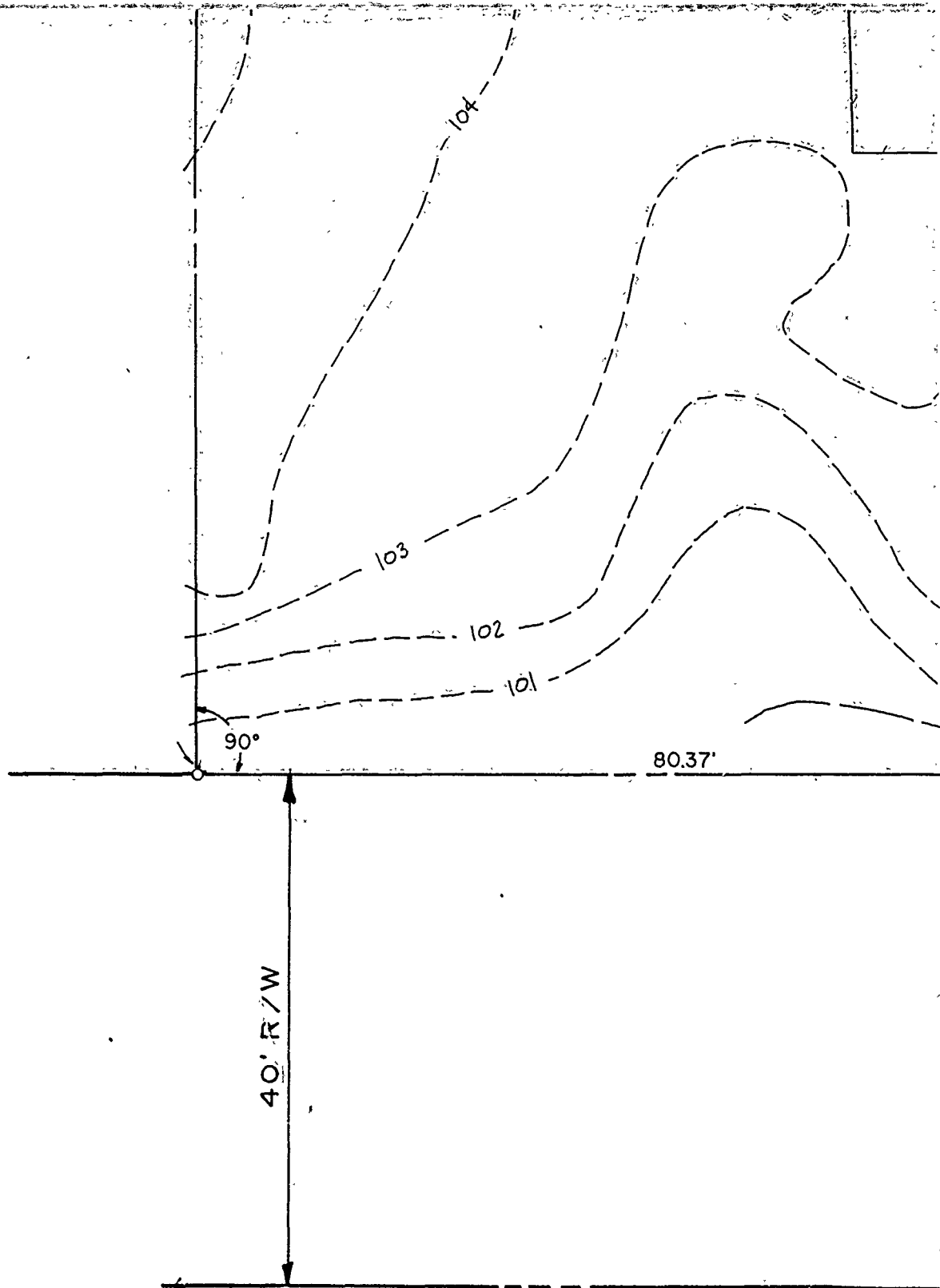


LOCATION. MAP

AVENUE

This is a detailed black and white map of the Springfield, Massachusetts area. The map shows a dense network of streets, including major thoroughfares like Main Street, North Street, and South Street. Key landmarks and locations are labeled, such as 'LANSDOWNE BORO' (Lansdowne Borough), 'DARTMOUTH COLLEGE', 'DARTMOUTH CAMP', and 'DARTMOUTH COLLEGE'. A large circular area is marked with a crosshair, and a smaller circular area is marked with a crosshair. The map is oriented with North at the top.

LOCATION MAP





UNION AVENUE

NOTES

- LOT INFORMATION

#105 EAST

#107 EAST

- TOPOGRAPHIC INFO
SYSTEMS INC.

50' R/W

134.63' (DEED)

EXISTING

LANSLOWNE RADIO

105 - 107 EAST

BOROUGH OF LANSLOWNE

CATANIA ENGINEER
CONSULT

520 W. Mac DADÉ BOULEVARD

DWN. BY M.X.D. CKD. BY _____
DSG. BY T.M. DATE 12-20-88

NOTES

- LOT INFORMATION TAKEN FROM DEED.

*105 EAST DEED BOOK 1979 Pg. 584 DATED 1-5-61

*107 EAST DEED BOOK 76 Pg. 867 DATED 10-28-82

- TOPOGRAPHIC INFORMATION PROVIDED BY CHEM-NUCLEAR
SYSTEMS INC.

EXISTING SITE PLAN

LANSDOWNE RADIOACTIVE RESIDENCE COMPLEX
105 - 107 EAST STRATFORD AVENUE

BOROUGH OF LANSDOWNE

DELAWARE CO. PA.

CATANIA ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS

520 W. Mac DADE BOULEVARD

MILMONT PARK, PA. 19033

DWN. BY M.X.D. CKD. BY
DSG. BY T.M. DATE 12-20-88

SCALE
1" = 10' - 0'

DRAWING NO. 83037
SHEET 2 OF 2 SHEETS

EN: FROM DEED,

BOOK 1979 Pg. 584 DATED 1-5-61
BOOK 76 Pg. 867 DATED 10-28-82

ATION PROVIDED BY: CHEM-NUCLEAR

SITE PLAN

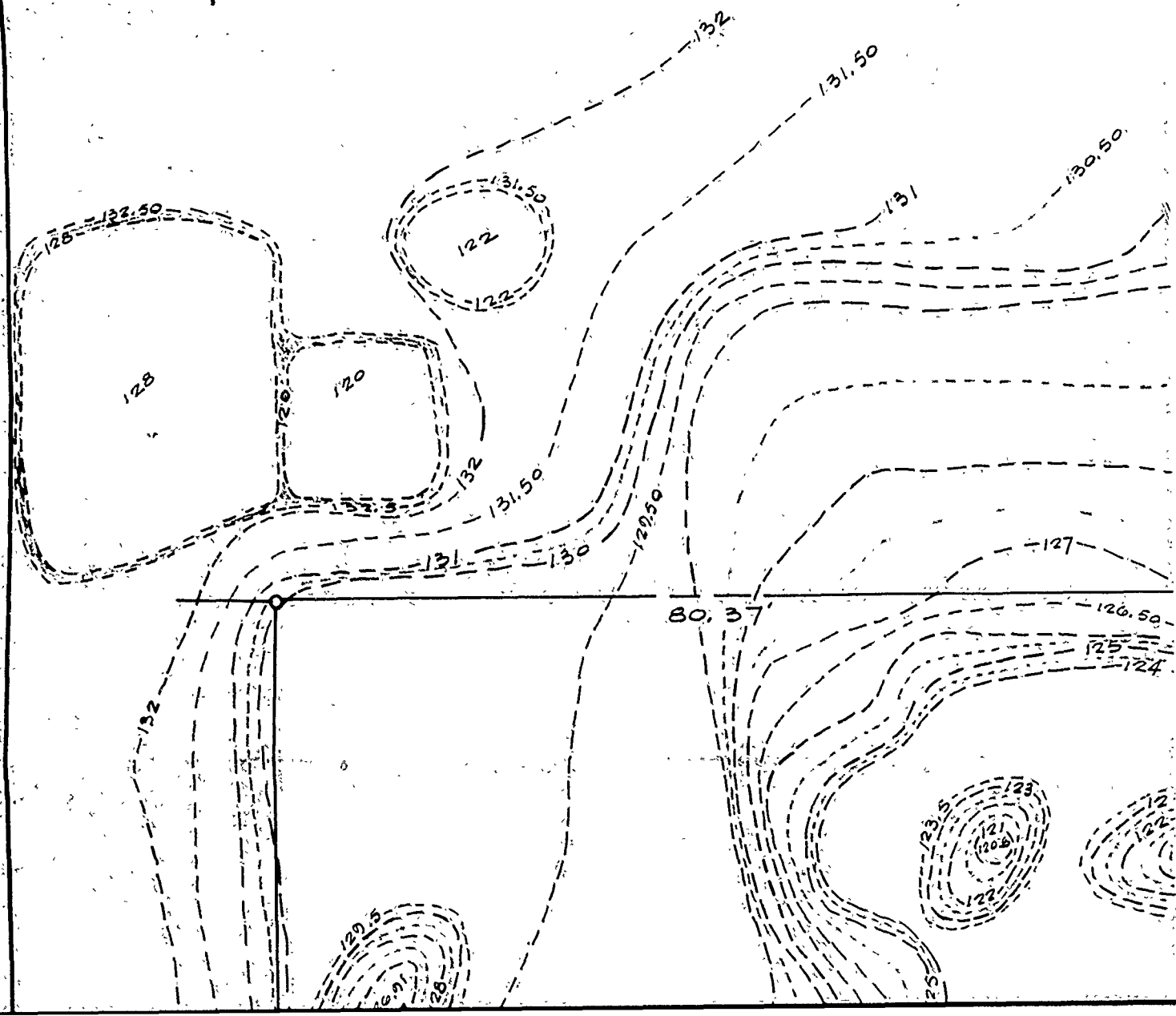
CTIVE RESIDENCE COMPLEX
STRATFORD AVENUE

DELAWARE CO. PA.

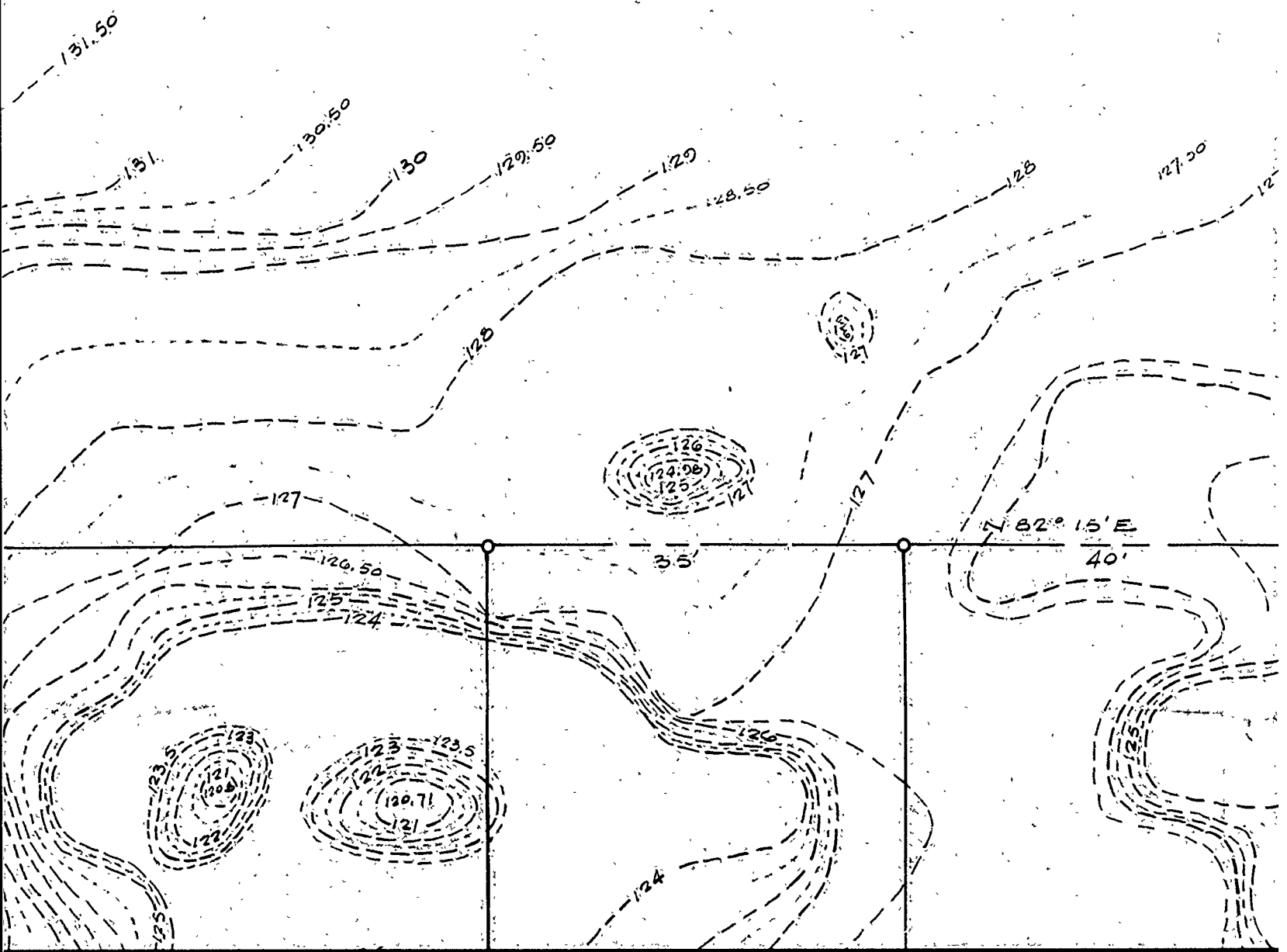
RING ASSOCIATES, INC.
N.G. ENGINEERS

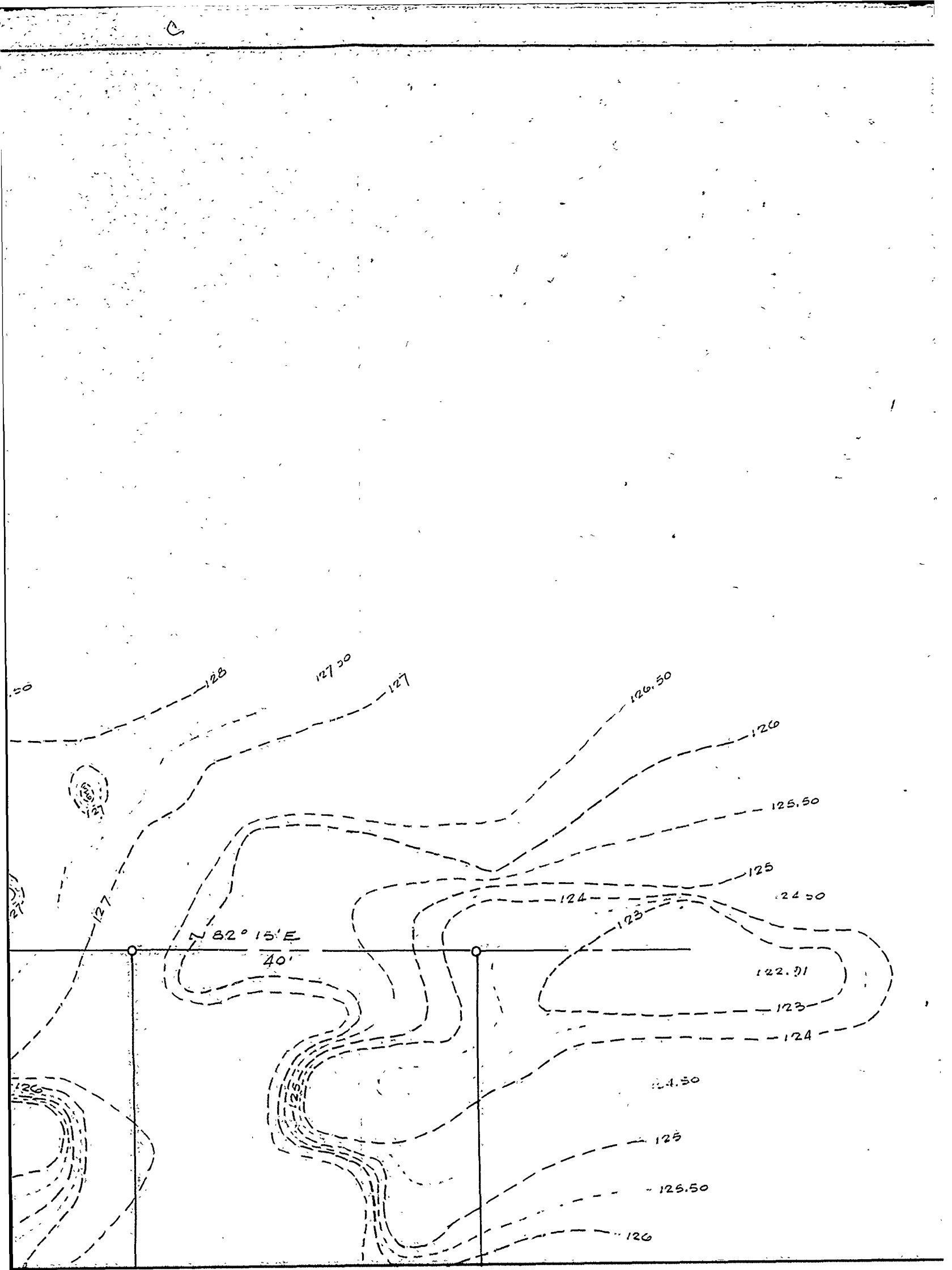
MILMONT PARK, PA. 19033

SCALE = 10' = 1"	DRAWING NO. <u>83037</u>
SHEET <u>2</u> OF <u>2</u> SHEETS	



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124

124.50

125

125.50



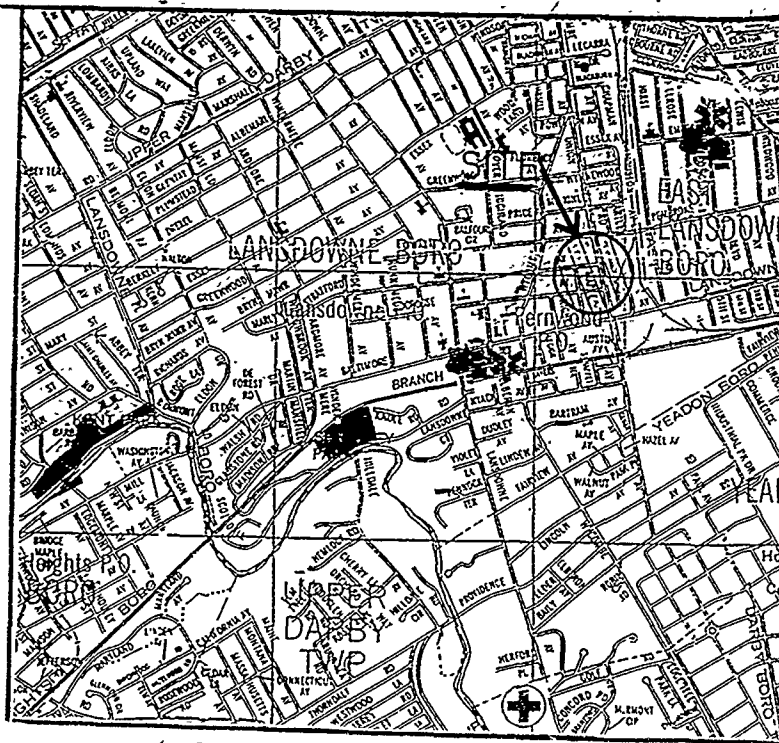
NOTES

BENCH MARK:

CHISELED SQUARE CUT IN TOP OF BRIDGE WALL AT SO
OF BALTIMORE PIKE BRIDGE OVER DARBY CREEK.

ELEVATION 70.78 (NATIONAL GEODETIC VERTICAL DAT

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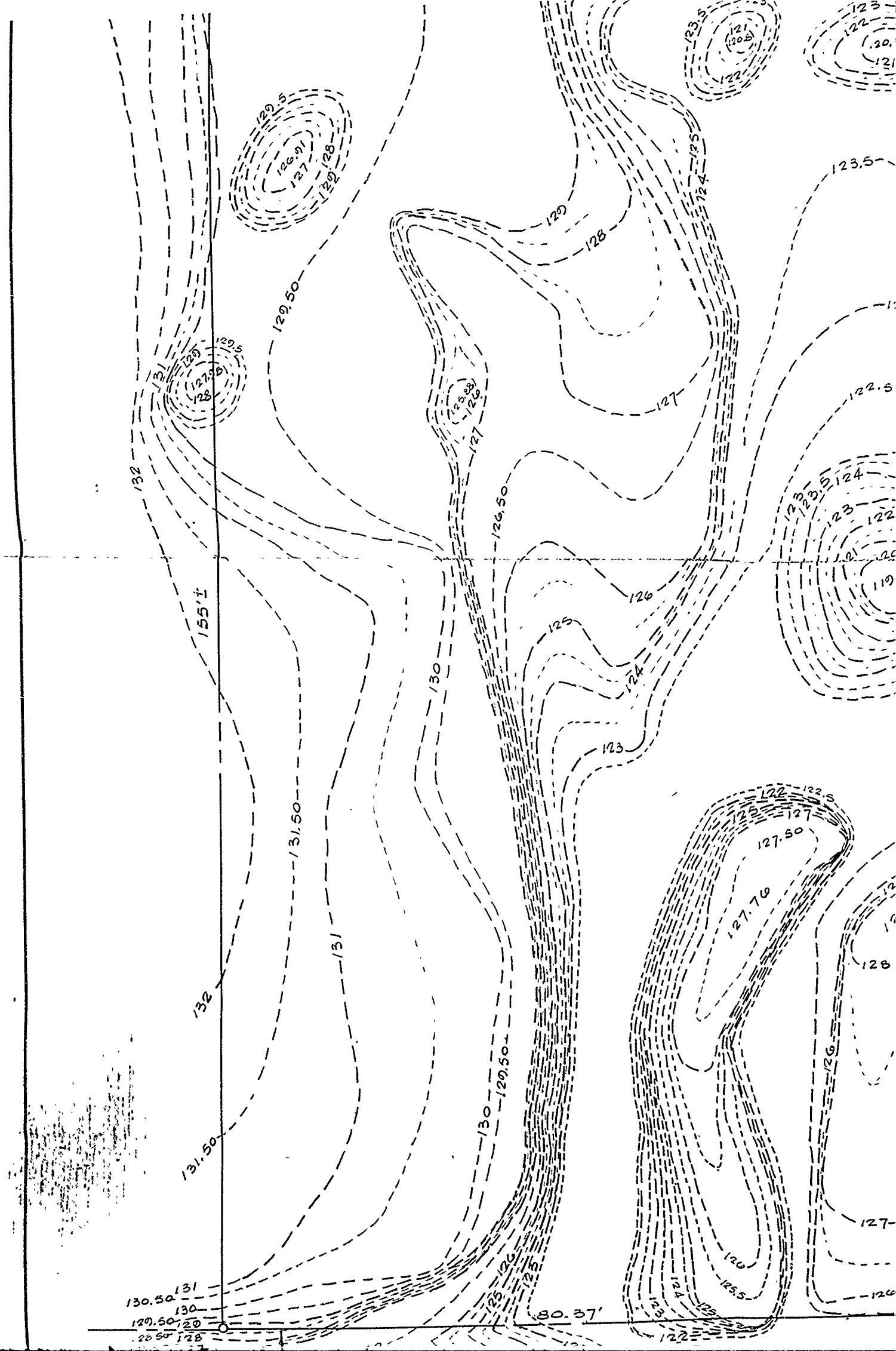
LOCATION MAP

NOTES:

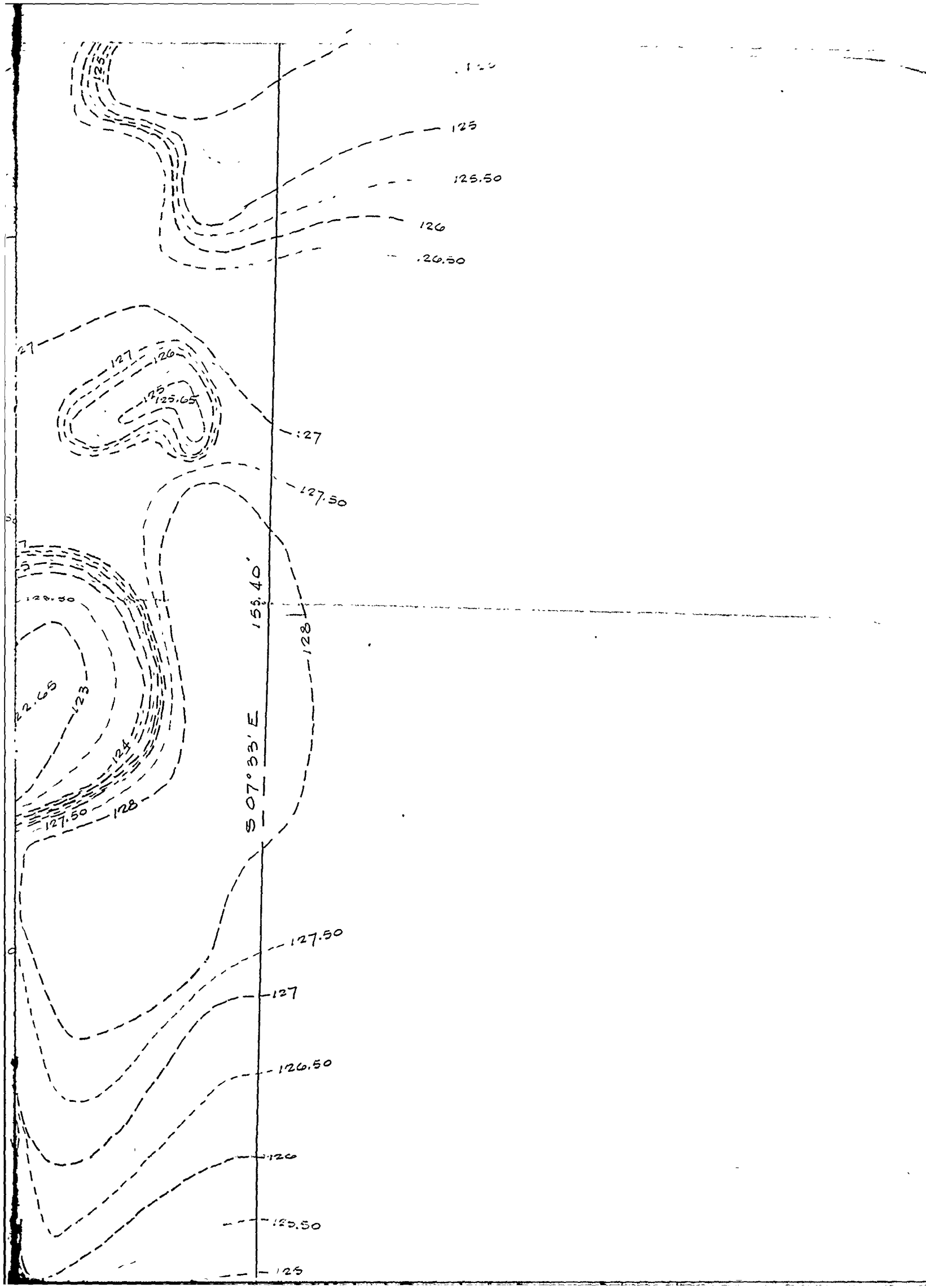
BENCH MARK:

CHISELED SQUARE CUT IN TOP OF BRIDGE WALL AT SOUTHEAST CORNER
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ELEVATION 70.78 (NATIONAL GEODETIC VERTICAL DATUM OF 1929)

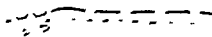






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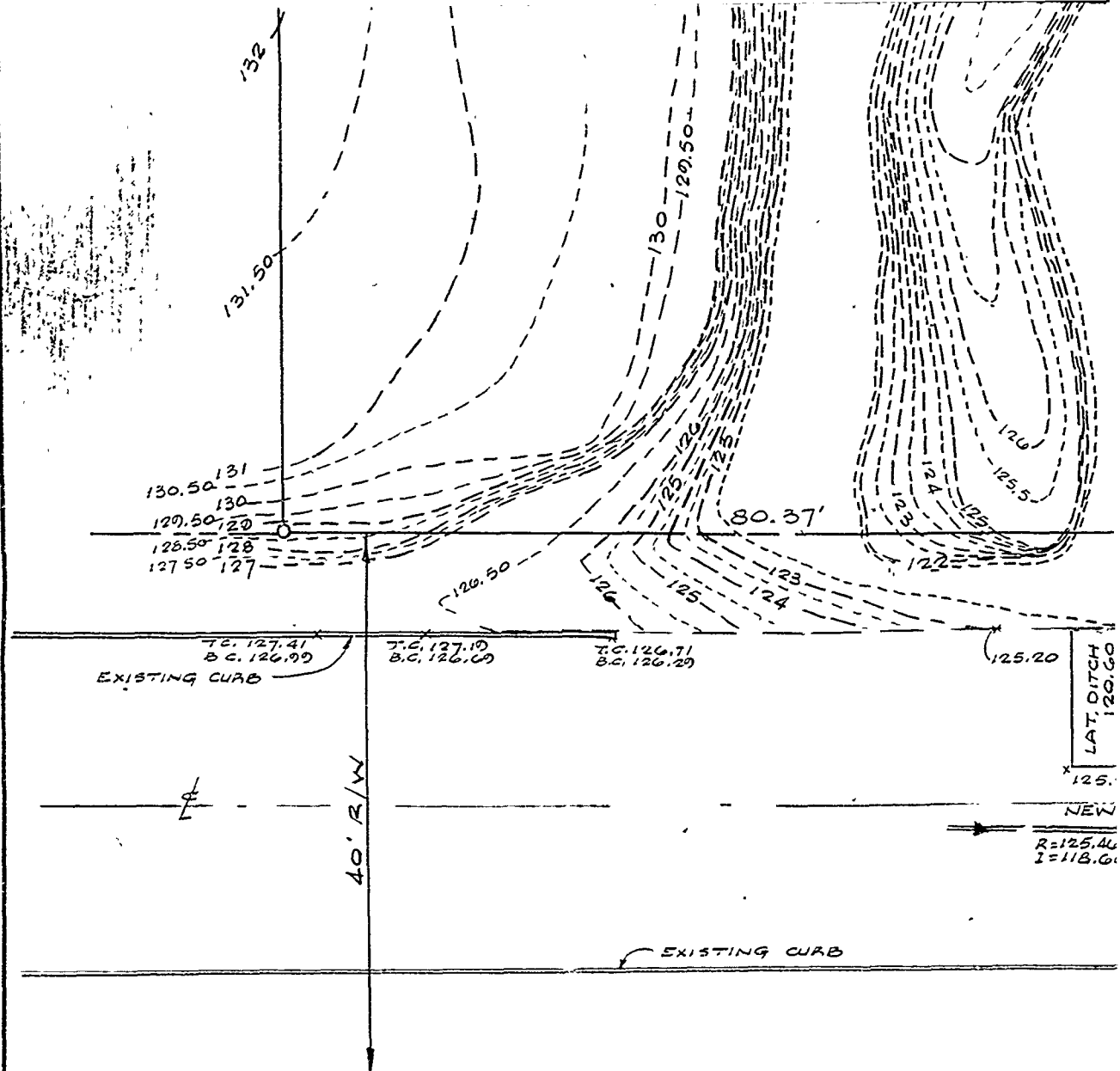
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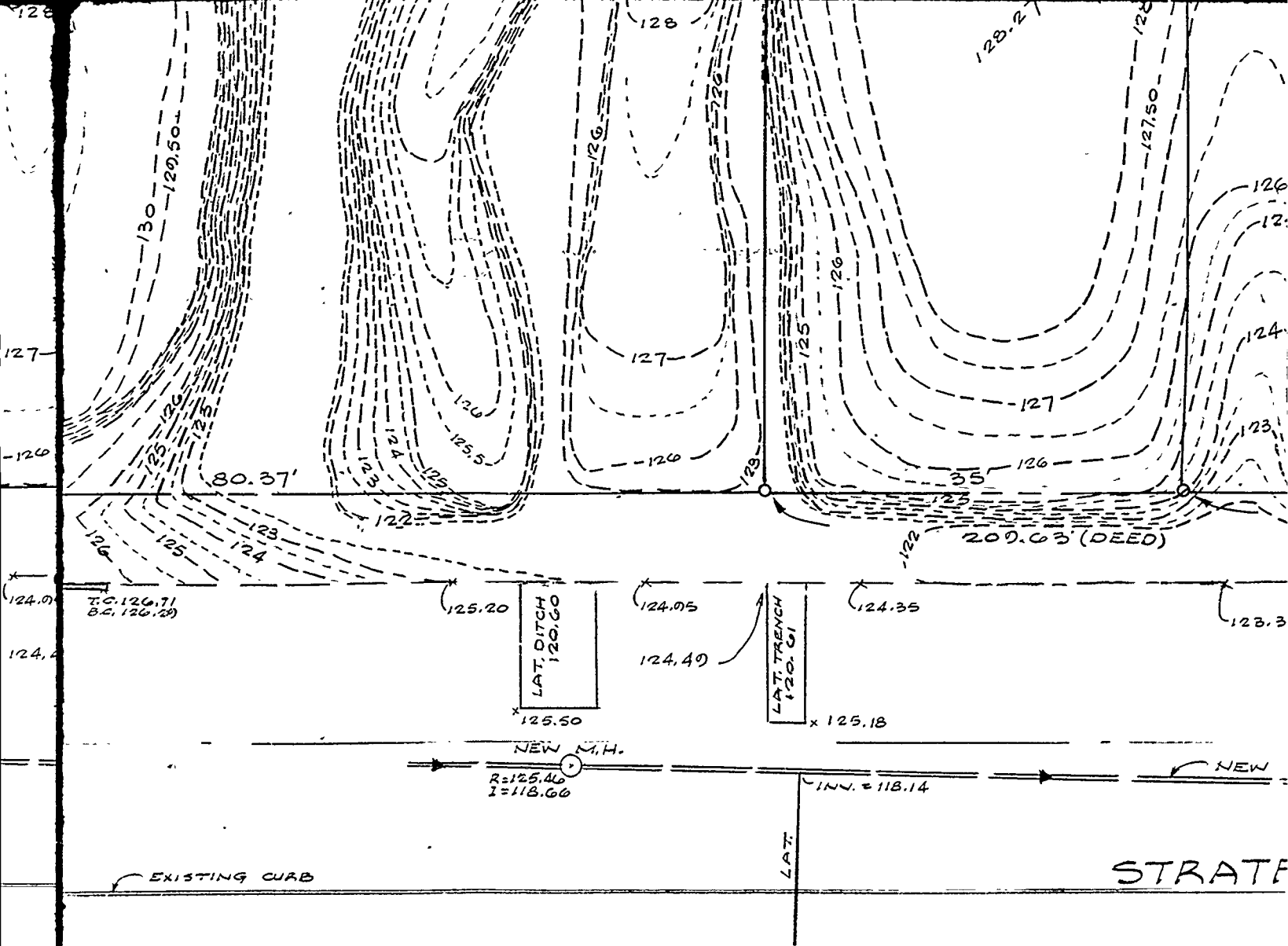
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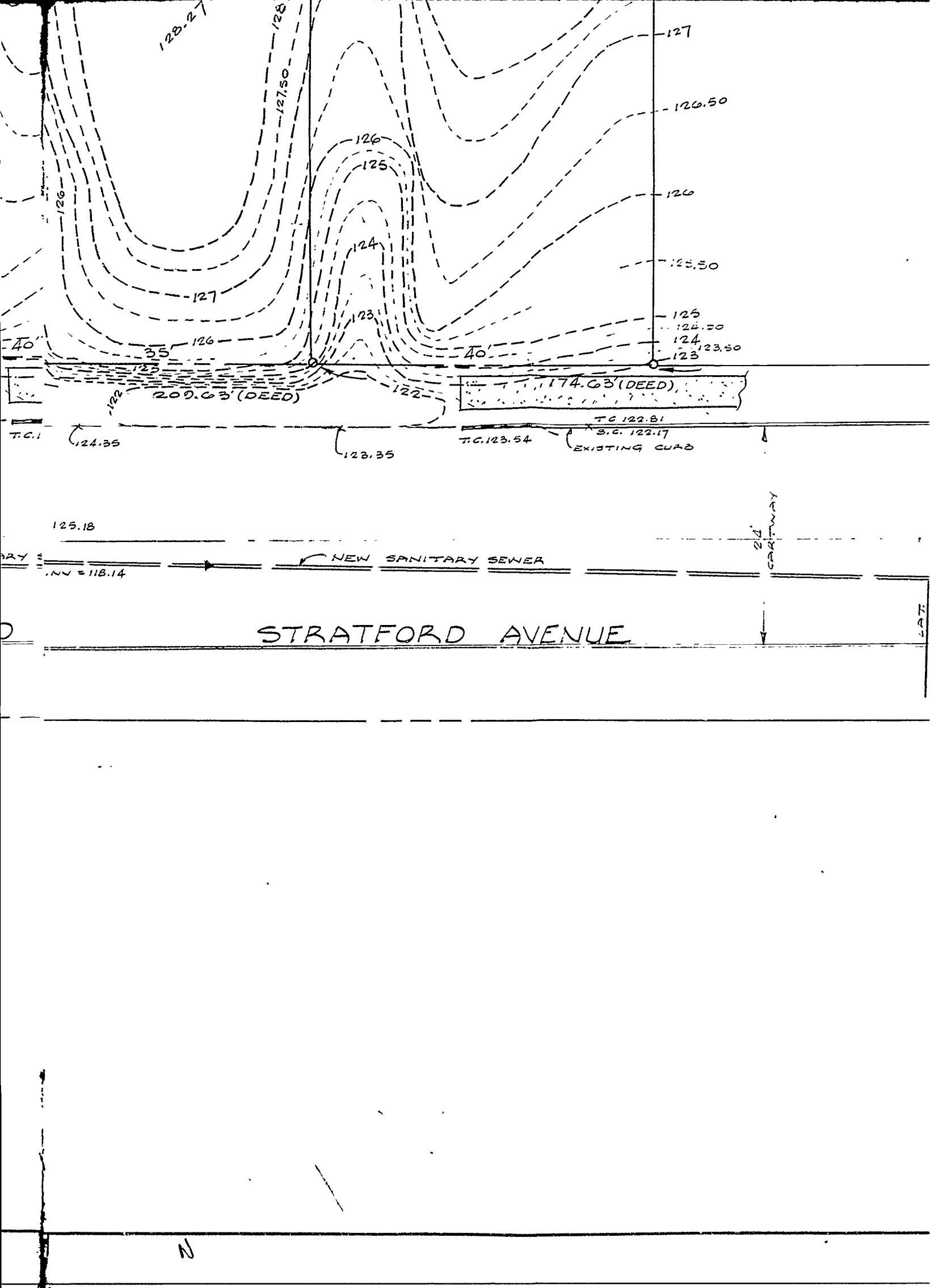
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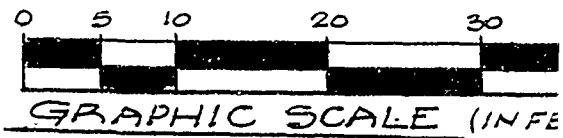
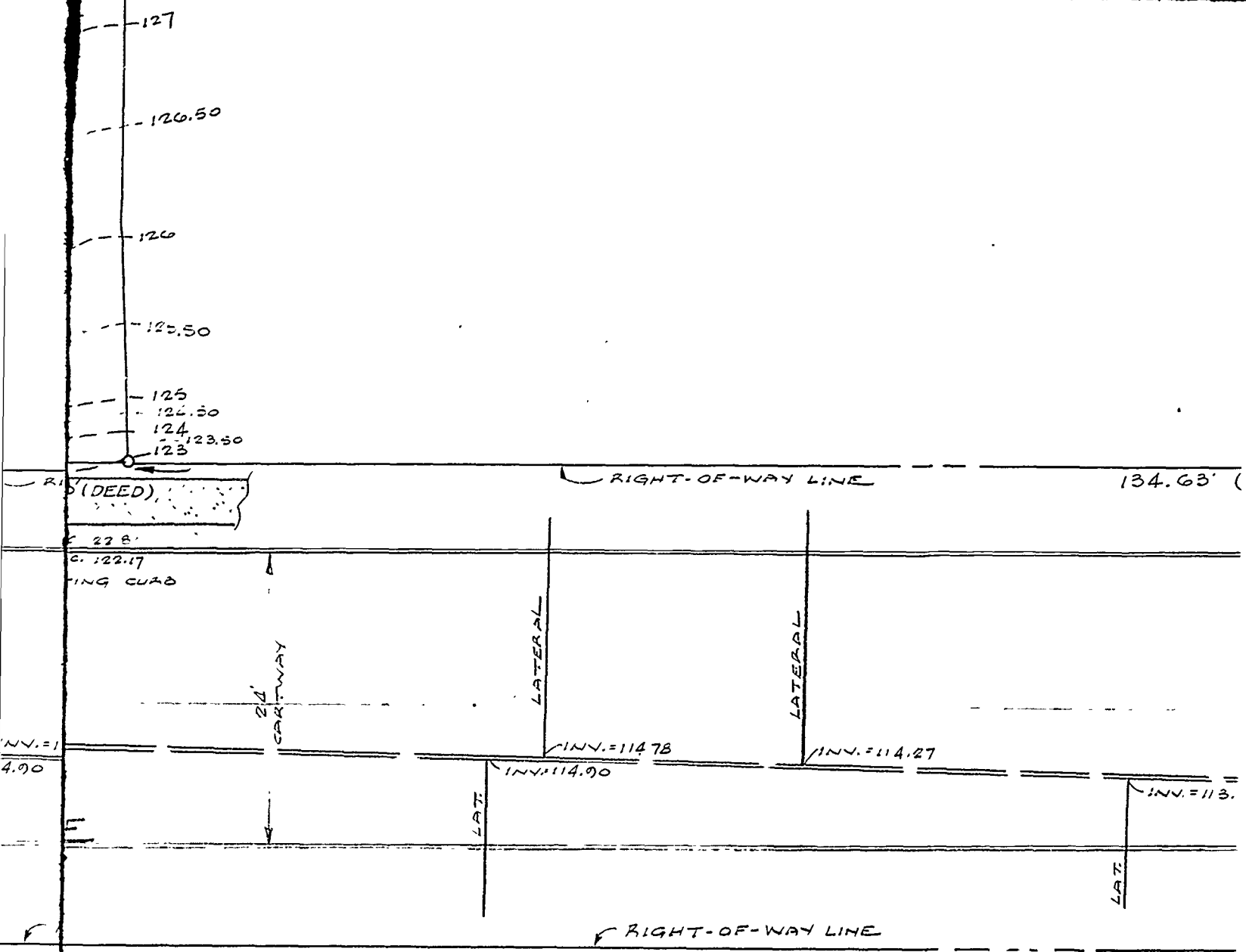
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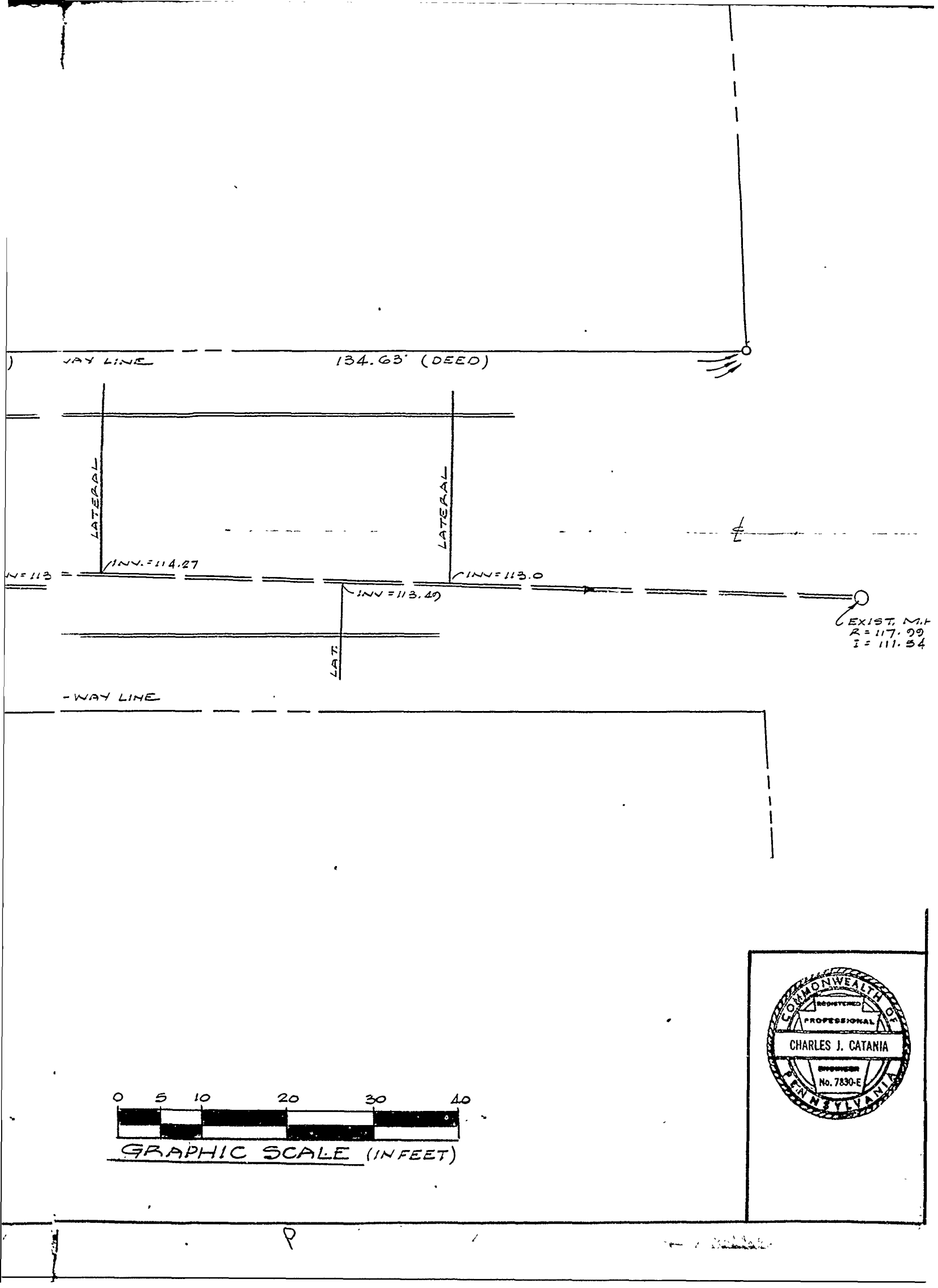
UNION AVENUE









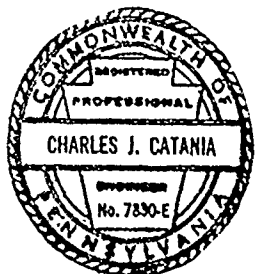


UNION AVENUE

EXIST. M.H.
R = 117.99
I = 111.34

TOPOGRAPHICAL PLAN OF EXCAVATED MATERIAL

LANSDOWNE RADIOACTIVE RESIDENCE COMPLEX
105 - 107 EAST STRATFORD AVENUE



BOROUGH OF LANSDOWNE

DELAWARE CO. PA.

CATANIA ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS

520 W. Mac DADE BOULEVARD

MILMONT PARK, PA. 19033

DWN. BY E.D.L.

CKD. BY C.J.C.

SCALE

DRAWING NO. 83037

DSG. BY C.

DATE 5/31/89

1" = 10'

SHEET 1 OF 1 SHEETS



LANSDOWNE

RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT

OPERATIONS CLOSEOUT REPORT

*CHEM-NUCLEAR SYSTEMS, INC.
220 STONERIDGE DRIVE
COLUMBIA, SOUTH CAROLINA*

CHAPTER 8
SEWER REMEDIATION

CHAPTER 8

SEWER REMEDIATION

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3.0	Sewer Remediation Methods	8-5
4.0	Sequence of Events	8-7
5.0	Waste Packaging and Disposal	8-8

LANDSLOWNE RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT

OPERATIONS CLOSEOUT REPORT

CHAPTER 8
SEWER REMEDIATION

1.0 INTRODUCTION

Sampling programs performed prior to project start during previous remediation and evaluation efforts, had identified contamination associated with the sanitary sewer system. Based upon this data, it was known that laterals from the residences at 105 and 107 E. Stratford Avenue, as well as the sewer main from the manhole in front of the residences downstream to the manhole at N. Union Avenue were contaminated. The actual extent and levels of contamination were not known due to inaccessibility of the areas. As part of work performed under the contract, survey and remediation of the sewer systems and associated soils to release criteria was required. This chapter addresses activities performed during the project to characterize and remediate the sewer systems. Specific details of a radiological nature are provided in the Radiological Closeout Report. Details of installation of the new sewer main are included in Chapter 10 of this report.

2.0 PREPARATIONS

2.1 Initial sampling of the sewer system during the project was performed on October 6, 1988. Chem-Nuclear Systems, Inc. personnel entered accessible areas of the sewer main (via manholes) to obtain physical samples and perform surveys. This was performed not only at the manholes in front of the project site and at the E. Stratford Avenue/N. Union Avenue juncture, but

also at an upstream location on E. Stratford Avenue and at upstream and downstream location on N. Union Avenue. Results of these samples and surveys were compared to historical data and showed contamination in the E. Stratford Avenue main and residence laterals, but no contamination present in the N. Union Avenue main.

- 2.2 During the subsurface soils investigation performed by Argonne National Laboratory from December 12, 1988 through December 16, 1988, conduits were driven along the sewer laterals and E. Stratford Avenue sewer main. Results provided confirmation of contamination to varying degrees in these areas. No attempts were made to assess the N. Union Avenue main at this time.
- 2.3 From February 17, 1989 through February 20, 1989, Argonne National Laboratory personnel attempted to further define the extent and levels of contamination in the sewer system. This was accomplished by passing a detector through the sewer main and collecting data. Attempts to perform this along the E. Stratford Avenue main proved futile due to the inability to access the probe into the line. It was assumed that partial obstruction of the line due to root intrusion and piping deterioration was at fault. Surveys performed along the N. Union Avenue main were not conclusive, although anomalies were observed in levels of exposure at two points upstream (north) of the N. Union Avenue/E. Stratford Avenue manhole.
- 2.4 To further evaluate possible areas of contamination upstream on N. Union Avenue, a U.S. Army Corps of Engineers drilling crew and appropriate drilling equipment were mobilized on site. From March 7, 1989 through March 10, 1989, the Corps drilling crew, assisted by Argonne National Laboratory and Chem-Nuclear Systems, Inc. personnel, obtained samples along the N. Union Avenue main. Analysis of these samples showed no radium contamination. In final analysis, it was concluded that observed anomalies had been as a result of variations in levels of naturally occurring

radioisotopes and that contamination in this area was improbable due to the upstream location and very high flow rates in the N. Union Avenue main.

- 2.5 In addition to radiological preparations for sewer system remediation, various logistic concerns were addressed . The Chem-Nuclear Systems, Inc. office trailer and the crew break trailer were removed from the site. The Argonne National Laboratory mobile laboratory and the guard shack were relocated to allow for access.

3.0 SEWER REMEDIATION METHODS

- 3.1 Removal of overlying asphalt paving material and concrete in areas above previous gas, electric and water utility excavations was broken up by jackhammering. The reduced material was removed with heavy equipment or manually and placed into waste containers. This included material which had to be removed for cutbacks to allow for restoration activities.
- 3.2 Gross excavation of soils was accomplished using heavy equipment, primarily the John Deer Model 410 tractor/backhoe. Separation of clean/contaminated material was performed on a bucket by bucket survey method.
- 3.3 Removal of contaminated, vitrified clay sewer piping was accomplished by manual means. An attempt was made to remove piping sections intact, with residual sludge remaining inside. Piping sections were bagged or placed in garbage cans, placed into waste containers, and crushed to maximize packaging efficiency.
- 3.4 Removal of residual contaminated soils and hot spots was accomplished manually, with waste placed into buckets for transport to waste containers.

- 3.5 Contaminated rock (Sapprolite) encountered during excavation was reduced using pneumatic or electric hammers, removed and placed into waste containers.
- 3.6 In order to permit removal of the old sewer main without interruption of service to residences, the entire new main was installed and tied in prior to removing the old main from service. Interruption of individual residence service was only necessary while the old lateral tie-in was removed to install the tie-in to the new main.
- 3.7 Prior to start of the sewer main excavation, Philadelphia Electric Company utility gas service personnel deactivated the E. Stratford Avenue gas main after installation of a new supply-header along the medium strip on the south side of E. Stratford Avenue. This was done by PECO as part of their normal upgrade and replacement program, but by coordinating this activity to occur prior to excavation, sewer work was facilitated and the hazard level reduced.
- 3.8 City water supply piping was, for the most part, located outside of the excavation area. Individual residence water supply piping, as encountered, was left in place and worked around.
- 3.9 Due to the depth of trenching required (up to nine feet) and the length of time required, a shoring system was utilized for sewer main work. This system utilized 2" X 12" or 2" X 10" oak stringers, 2" X 6" fir uprights and 4" X 4" fir or 2" heavy pipe/pine jackcross pieces. In addition, in work areas with unstable or loose materials along sidewalls, 3/4" plywood was placed along sidewalls during work.
- 3.10 To preclude personal injury and to restrict access to the sewer trench, a wooden barrier and caution tape was placed along open, accessible areas. Flashing caution lights were placed on barricades in areas of potential vehicular traffic hazard.

- 3.11 Groundwater encountered during excavation as well as rainwater intrusion was removed by pumping or draining into the sewer system. As part of sewer restoration activities, a French drain system was installed as discussed in Chapter 10.

4.0 SEQUENCE OF EVENTS

- 4.1 Following bulk removal of contaminated soil from the front yard and complete removal of the residence, the 107 E. Stratford Avenue residence sewer lateral was removed. Removal of overlying soil was completed, with most of this material being uncontaminated. The lateral piping, when exposed, showed only minimal exterior contamination in excess of the approved site criteria. Removal of the 107 lateral from the residence end to the sidewalk was performed on March 17, 1989.
- 4.2 From March 17, 1989 through March 20, 1989, the 105 E. Stratford Avenue residence lateral was removed from the residence end to the sidewalk. Overlying soil was removed to expose the lateral, with significant amounts of contaminated soil noted. Contaminated lateral piping was removed and packaged. Following pipe removal, the underlying contaminated soil was excavated.
- 4.3 Excavation for installation of the new sewer manhole on E. Stratford Avenue was begun on March 28, 1989. The location selected was at the point of confluence of the 105 residence lateral to the main. An initial excavation of approximately 6' X 8' was made and was expanded to allow for removal of contaminated material, resulting in a final size of approximately 9' X 12' X 9' deep. Final cleanup of this excavation was completed in preparation for manhole base placement on April 18, 1989. Considerable amounts of jackhammering to remove rock was required during this phase.

- 4.4 To allow for continued residential service, excavation for the new sewer main installation and cleanup of contaminated soil in the pipe bedding area was performed. This work was performed from April 1, 1989 through April 17, 1989. Shoring was installed concurrently with the progress of excavation.
- 4.5 Due to large amounts of ground water intrusion into the sewer excavation, bedding of the new main required installation of a French drain system. This was accomplished on April 17, 1989, and is further discussed in Chapter 10.
- 4.6 After the new sewer main had been installed to permit continued flow of sewage, removal of the old sewer main was begun. Piping was removed starting at the west (upstream) end in E. Stratford Avenue, working towards N. Union Avenue. As piping was removed, underlying soil areas were surveyed and remediated. In general, the greatest amounts of contamination were located around piping joint areas, however, due to cracking, root intrusion and general deterioration of the main, most underlying soils were contaminated to a degree. As piping was removed in areas of lateral tie-ins to residences, the services were shifted to the new main. This phase of sewer remediation was completed between April 19, 1989 and April 24, 1989.
- 4.7 Remaining portions of the 105 and 107 E. Stratford Avenue sewer laterals were removed May 6 and 8, 1989. Contamination was much the same as previously discussed in sections 4.1 and 4.2.

5.0 WASTE PACKAGING AND DISPOSAL

- 5.1 Soil removed during the sewer excavation process was surveyed and sampled to determine radiological status. Soils found to be contaminated were placed directly into disposal containers, compacted, and prepared for shipment.

- 5.2 Clean soils excavated from the 105 and 107 E. Stratford Avenue properties were set aside for disposition during backfill. Clean soils excavated from municipal areas were found to be unsuitable for use as backfill due to high quantities of clay and large stone. As a result, these materials were resurveyed and sampled and transported to the vacant lot at 86 E. Stratford Avenue as fill, which was previously arranged with the owner. The clean materials were spread out as requested by the resident and additional surveys performed by Chem-Nuclear Systems, Inc. and Argonne National Laboratory personnel.
- 5.3 Rubble generated during sewer excavation consisting of concrete, asphalt and piping materials were loaded directly into disposal containers and prepared for shipment.
- 5.4 Final volumes of contaminated soil and rubble are addressed in Chapter 9.



LANSDOWNE

RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT

OPERATIONS CLOSEOUT REPORT

***CHEM-NUCLEAR SYSTEMS, INC.
220 STONERIDGE DRIVE
COLUMBIA, SOUTH CAROLINA***

CHAPTER 9 WASTE HANDLING

CHAPTER 9

WASTE HANDLING

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LANSDOWNE RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT
OPERATIONS CLOSEOUT REPORT

CHAPTER 9
WASTE HANDLING

1.0 INTRODUCTION

During the project, three major categories of waste were processed. These were radioactive waste, hazardous waste and non-radioactive non-hazardous waste. In addition, radioactive waste was further classified as rubble or soil for costing and tracking purposes. This chapter discusses the various methods employed for classification, packaging, transport and disposal of these wastes. Also provided is detailed information on waste volumes and pertinent shipping data.

2.0 WASTE CLASSIFICATION

2.1 RADIOACTIVE WASTE

2.1.1 Field classification of waste was performed to determine its radiological status as the waste was generated. In general, this involved radiological survey and sampling for comparison to established release criteria. Waste exhibiting levels of radiological material in excess of established site criteria was handled, packaged and disposed of as radioactive waste. Specific survey methods are delineated in the Radiological Closeout Report.

2.1.2 Radioactive materials generated during dismantlement and removal of man made structures were further classified as "rubble". These materials included wood, brick, asphalt, concrete and metal structural materials

as well as personnel possessions and trash remaining within the structures. Also included were vitrified clay piping and fittings removed during sewer remediation.

2.1.3 Radioactive waste designated as "soil" included earthen materials, stone, tree stumps and roots and incidental amounts of man-made materials generated during the excavation process.

2.1.4 Following packaging and prior to shipment, additional surveys of each waste container were performed. These surveys were made to provide estimates of radiological activity for the purpose of compliance with Department of Transportation shipping requirements and the Envirocare of Utah disposal site criteria.

2.2 HAZARDOUS WASTE

2.2.1 During the conduct of project dismantlement and removal operations, many materials of a potentially hazardous nature were encountered. These materials were in the form of household wastes from both residences and garages as left by previous residents. In addition, several drums of material, including potentially hazardous materials, had been left behind during previous attempts by other organizations to remediate the structures.

2.2.2 Wastes handled as potentially hazardous included those with specified hazardous ingredients on labels, with ingredients which were not readily identifiable as non-hazardous in nature and containers without labels for which constituents were unknown.

2.2.3 The first activity performed for potentially hazardous wastes was consolidation and inventory. Wastes were collected and identified to the extent possible, with a listing prepared as shown in Figure 9-1. This inventory was provided to the U.S. Army Corps of Engineers, Argonne National Laboratory, the U.S. Environmental Protection Agency and potential waste processing and disposal contractors.

2.2.4 Samples of waste materials were obtained and analyzed to assure that they were of a non-radiologic nature and did not contain radioactive contaminant in excess of release limits.

2.2.5 Waste containers were surveyed to assure that contamination was not in excess of release criteria. Containers were decontaminated as required, and, in cases where decontamination was not possible, the contents were transferred to clean containers and the contaminated container processed as radioactive waste.

2.2.6 Upon Selection of the hazardous waste disposal contractor, GSX Services, Inc., the unknown materials were sampled and analyzed to determine processing and disposal requirements.

2.3 NON-RADIOACTIVE NON-HAZARDOUS WASTE

2.3.1 Few demolition materials were produced during project activities which exhibited levels of radioactivity by surveying which were below the site criteria and which did not contain materials of a potentially hazardous

nature. Items which met these criteria consisted of trees and branches removed from the project site and adjacent properties, rubble removed from the driveways at 110 and 112 E. Stewart Avenue, portions of garage slabs at 110 and 112 E. Stewart Avenue, small amounts of clean material from paving on E. Stratford Avenue, asphalt "cold patch" which had been used as a base for the Operations Support Facility, and clean materials generated during repair of sidewalks and curbs along N. Union Avenue, E. LaCrosse Avenue and Maple Avenue.

- 2.3.2 In most cases, soils which were below site criteria were not excavated. In some cases, however, it was necessary to remove amounts of clean soil to enable removal of underlying contaminated soils or materials. In these cases, additional surveys and analyses were performed to assure soils were not contaminated prior to disposition.

3.0 WASTE PACKAGING

3.1 RADIOACTIVE WASTE

- 3.1.1 Radioactive waste materials, both soils and rubble, were packaged in steel B-25 containers as shown in Figure 9-2. The only exception to this was four drums of waste which had been accumulated from previous decontamination attempts which were repackaged, inspected, surveyed and shipped in the drums.
- 3.1.2 Radioactive rubble was placed directly into the B-25 containers as it was generated. During the initial cleanup and removal of trash and other light weight materials, very light container weights resulted, even though extensive attempts were made to ensure that voids in packagings were eliminated. At dismantlement

progressed, heavier materials were generated which allowed packaging efficiency to be increased. To the extent possible, lighter and compressible materials were placed in the bottom of the container and denser, non-compressible materials placed on top. During the project, a total of 474 containers of rubble material were packaged with an average waste density of 67.36 pounds per cubic foot.

- 3.1.3 Radioactive soils were placed directly into the B-25 containers as they were excavated. Soils were compacted within the container in lifts by use of a pneumatic tamper operated by laborers working within the container and by compressing with the bucket of the excavation equipment. During the project, a total of 883 containers of soil were packaged with an average waste density of 103.44 pounds per cubic foot.
- 3.1.4 Prior to removal of the waste packages from the controlled area, the exterior was thoroughly surveyed to assure that no external contamination was present.
- 3.1.5 Each radioactive waste container was weighed and the weight recorded for activity calculation and billing purposes. Scales used were routinely tested and calibrated to meet certification requirements.

3.2 HAZARDOUS WASTE

- 3.2.1 Hazardous waste packaging for shipment was accomplished by GSX Services, Inc. under subcontract from Chem-Nuclear Systems, Inc.
- 3.2.2 Packaging of hazardous waste was accomplished on June 8, 1989 in conjunction with sampling and segregation activities. Specific packaging and shipment data is provided in Section 4.2.

3.3 NON-RADIOACTIVE, NON-HAZARDOUS WASTES

- 3.3.1 Because of the freely releasable status of these wastes, no special packing requirements were imposed. The only containerization utilized as for bulk shipment, which consisted of 20 and 25 cubic yard roll-off containers provided by Nuway Disposal.
- 3.3.2 Waste placed in the drop off containers was loaded with branches placed on the bottom and heavier logs and wood placed on the top to maximize loaded weights.
- 3.3.3 A total of six containers with 135 cubic yards of material were shipped from the project to the GROWS landfill near Morrisville, Pennsylvania.

4.0 WASTE TRANSPORT

4.1 RADIOACTIVE WASTE

- 4.1.1 Transportation of radioactive waste materials from the Lansdowne, Pennsylvania project site to the Clive, Utah disposal facility was performed under subcontract to Chem-Nuclear Systems, Inc. by Ranger Transportation, Inc. and TAD Trucking Company.
- 4.1.2 A total of 289 radioactive waste shipments consisting of 1,357 B-25 containers and 4-55 gallon drums were made. TAD Trucking Company made 23 of these, with Ranger Transportation, Inc. completing 266. An average of 4.7 B-25 containers were transported with each shipment.
- 4.1.3 Waste containers were selected for each shipment based upon weight while maintaining overall shipment weight below allowable limits.

4.1.4 All shipments were verified to be in compliance with all applicable Department of Transportation regulations.

4.1.5 Shipment data for radioactive soil waste is given in Figure 9-3.

4.1.6 Shipment data for radioactive rubble waste is given in Figure 9-4.

4.2 HAZARDOUS WASTE

4.2.1 Hazardous waste materials were transported by GSX Services, Inc. under subcontract to Chem-Nuclear Systems, Inc.

4.2.2 A total of three shipments were made, the first being known materials which were not in pressurized (aerosol) containers. The second shipment consisted of pressurized (aerosol) containers and the third shipment consisted of the remainder of the materials which had been tested to determine content/hazard classification.

4.2.3 A summary of hazardous waste shipments is given in Figure 9-5.

4.3 NON-RADIOACTIVE, NON-HAZARDOUS WASTE

4.3.1 Branches, logs and wood pieces from removal of trees on site which were verified to be releasable as non-radioactive, non-hazardous were transported by Nuway Disposal.

4.3.2 A total of six truck shipments were made with 135 cubic yards of material and a total weight of 28.02 tons. A summary is given in Figure 9-6.

5.0 WASTE DISPOSAL

5.1 RADIOACTIVE WASTE

5.1.1. All radioactive waste materials were disposed of at the Envirocare of Utah Naturally Occurring Radioactive Material (NORM) facility at Clive, Utah. This site is an open fill disposal facility accepting materials with specific activities which are in the range of similar isotopes occurring in natural formations.

5.1.2 Upon receipt at the disposal site, waste packages were inspected for compliance with disposal site and DOT requirements. Upon satisfactory completion of this inspection, waste materials were offloaded and Chem-Nuclear Systems, Inc. notified of acceptance. Of 1,361 waste containers, all were found to be acceptable at the disposal site.

5.1.3 The final total volumes of waste disposed of at the site were 127,965.1 cubic feet representing 11,093,483 pounds (5,546.7415 tons).

5.2 HAZARDOUS WASTE

5.2.1 Disposal of hazardous waste materials was coordinated by GSX Services, Inc. under subcontract to Chem-Nuclear Systems, Inc. The specific site selection was determined by waste constituents, waste form and site permit requirements. Disposal facilities are shown in Figure 9-5.

5.2.2 A total of three shipments of hazardous waste were made, with a total of 23 containers weighing 585 pounds.

5.3 NON-RADIOACTIVE, NON-HAZARDOUS WASTE

- 5.3.1 Waste materials in drop off boxes which were generated during site clearing activities were disposed of at the Waste Management GROWS Facility, Morristown, PA. Additional radiological surveys were performed at the disposal site to verify the non-radiological status prior to disposal.
- 5.3.2 Logs, firewood and wood chips generated during removal of trees from off site areas were surveyed and verified to be non-radioactive. Two logs (one walnut and one Norway Maple) were returned to the resident at 99 E. Stratford Avenue at her request. All other materials were turned over to Eagle Tree Service for disposition.
- 5.3.3 Clean rubble removed from the driveways at 110 and 112 E. Stewart Avenue were turned over to the paving contractor, R. J. DeFrank for disposition following survey.
- 5.3.4 Clean rubble removed from the garage slabs at 110 and 112 E. Stewart Avenue was dispositioned by placing in the bottom of deep excavations during backfilling as requested by the U.S. Army Corps of Engineers.
- 5.3.5 Clean soil excavated on-site was surveyed and utilized during backfill operations.
- 5.3.6 Clean soil excavated from E. Stratford Avenue during sewer remediation was transported to a vacant lot at 86 E. Stratford Avenue and used for fill. Additional sampling and surveys were performed prior to and after transport.

INVENTORY OF CHEMICAL HAZARDOUS WASTE

Sample Number	Product Name	Type Container
001	CLEANING SOLVENT, OCTAGON PROCESS, INC.	6 OUNCES
002	BRASSO	7 OUNCES
005	PASTE SOLDERING FLUX, SIMLEX	1 POUND
016	MALCO SPRAY UPHOLSTERY FABRIC CLEANER	16 OUNCES
021	KLENZTONE	1 GALLON
022	ENAMEL PAINT KEM-GLO	1 QUART
023	PLASTIC WOOD	1 POUND
024	EPOXY TUB AND TILE FINISH	1 PINT
025	ENAMEL PAINT KEM-GLO	1 QUART
026	UGL DRYLOK FAST PLUP	1 QUART
028	EPOXY TUB AND TILE FINISH	1 PINT
032	DURA-WELD	1 QUART
033	BAYGEE ENAMEL	1 QUART
036	PALCO CLEANSER	1 POUND
037	4 TUBES HARRISON PAINT TINT	
038	PLY-TILE ACTIVATOR	1 GALLON
039	MASTER MIXED SILVER GRAY PAINT	1 GALLON
041	NOKORODE SOLDEING PAST	8 OUNCES
042	ARMSTRONG EMULSION S-160	1 QUART
045	MAB PLY-TILE COATING	1 GALLON
046	MAB PLY-TILE PRIMER	1 GALLON
047	SEARS MASTER MIXER ENAMEL	1 GALLON
048	MAB PLY-TILE COATING	1 GALLON

Figure 9-1

049	METEOR MASTIC	1 GALLON
050	MAB PLY TILE COATING	1 GALLON
052	GLIDDEN FLOOR PAINT	1 GALLON
055	GLIDDEN ENAMEL	1 QUART
056	WETHERILL'S FLOOR VARNISH	1 QUART
059	ENAMEL PAINT	1 GALLON
060	ENAMEL PAINT	1 GALLON
061	PENN VALLEY ENAMEL PAINT	1 GALLON
062	FINNAREN AND HALEY ENAMEL PAINT	1 GALLON
063	ENAMEL PAINT	1 GALLON
066	ADELPHI MARINE SPAR VARNISH	1 QUART
067	WESTMINSTER WOOD FILLER	1 QUART
069	RICH LUX ENAMEL	1 PINT
071	BENJAMIN MOORE FLOOR ENAMEL	1 QUART
073	FINNAREN AND HALEY ACRYLIC	1 QUART
074	ACRYLIC HOUSE PAINT	1 QUART
075	WOOD SEALER	1 PINT
076	PITTSBURGH WATER SPAR ENAMEL	1 PINT
077	DULL-FINISH VARNISH	1 PINT
095	SCOTTS LIQUID GOLD	1 PINT
100	WEHERILL'S 4-5 ENAMEL	1 PINT
101	FINNAREN AND HALEY ENAMEL	1 GALLON
102	BEACON WAX REMOVER	1 QUART
103	RUST-O-LASTIC PRIMER	1 QUART
104	WETHERILL'S 4-R VARNISH	1 PINT
106	STA-DRI WATER STOP	1 PINT
108	RUST-O-LASTIC	1 QUART
109	HIGH GLOSS ENAMEL	1 PINT
110	PECORA ASBESTOS FURNACE CEMENT	1 PINT
117	SAVOGRAN STRYPEEZE	1 QUART
125	SHEFIELD CLEAR LACQUER	1/4 PINT
126	STERNO	2 1/2 OUNCES
128	MOTH CHASE	5 POUNDS
130	SHERWIN-WILLIAMS ENAMELOID	1/2 PINT
133	SSS-T STEAM IRON CLEANER	1 PINT
135	GLIDDEN ENAMEL	1/2 PINT

137	STERNO	2 1/2 OUNCES
138	KLONDIKE GOLD PAINT	1/2 PINT
139	PEERLESS ENAMEL	1/2 PINT
140	MAB OIL STAIN	1/2 PINT
141	STERNO	2 1/2 OUNCES
142	STERNO	2 1/2 OUNCES
143	MAB ENAMEL	1 QUART
144	WETHERILL'S VARNISH	1 PINT
150	COROGARD	1/2 PINT
153	FINNARIN YELLOW ENAMEL	1 QUART

5 GALLON PLASTIC PAIL (COMPOSITE)

029	IMPERVO ENAMEL	1 QUART
031	OIL STAIN	1 PINT
034	PLY-TILE PRIMER	1 GALLON
035	SEARS LATEX HOUSE PAINT	1 GALLON
040	XL FLOOR AND DECK ENAMEL	1 GALLON
043	MINIT KOTE WALL PAINT	1 QUART
064	PENN VALLEY ENAMEL PAINT	1 GALLON
065	FINNAREN AND HALEY ENAMEL PAINT	1 GALLON
070	DUPONT DUCO & POLISH	1 QUART
072	TINNAREN AND HALEY FLOOR ENAMEL	1 QUART
096	DUPONT DUCO & POLISH	1 QUART
097	WETHILL ENAMEL	1 QUART
098	TUFCOTE VARNISH STAIN	1 PINT
099	WETHERILLS 4R ENAMEL	1 PINT
105	DUPONT BLUE ENAMEL	1/2 PINT
124	DUPONT DUCO PAINT	1/4 PINT
145	PORCELITE ENAMEL	1/2 PINT
146	WETHERILL'S ENAMEL	1/2 PINT
147	CARROLL LACQUER	1/2 PINT
152	PITCAIRN VARNISH	1/2 PINT
154	WETHERILL'S ENAMEL	1 QUART

1 QUART METAL CAN (COMPOSTIE)

118	ALUMINUM POWDER	1 POUND
121	ALUMINUM POWDER	1 POUND
148	ALUMINUM POWDER	1 POUND

AEROSOL CANS

006	RUSTOLEUM YELLOW
044	KRYLON SPRAY ENAMEL
054	HOT SHOT INSECT KILLER
078	END-O-PEST ROSE BUSHES AND FLOWER SPRAY
079	OFF INSECT REPELLENT
080	KRYLON CRYSTAL CLEAR
081	BEHOLD FURNITURE POLISH
082	OFF INSECT REPELLENT
083	HARTZ OUTDOOR NO
084	SCIENCE ROSE AND FLORAL SPRAY
085	SEARS ACRYLIC ENAMEL
086	RAID HOUSE AND GARDEN BUG KILLER
087	HOT SHOT ROACH AND ANT KILLER
088	RAID ANT AND ROACH KILLER
089	RAID ANT AND ROACH KILLER
090	RAID ANT AND ROACH KILLER
092	DIRTGARD GABRIC PROTECTOR
094	GOLD SPRAY PAINT
113	GLORY RUG CLEANER
114	RAID FLYING INSECT KILLER
115	LYSOL SPRAY DISINFECTANT
116	DAMAN VARNISH
122	VARATHANE

PESTICIDES

107	FLIT 5%	1 PINT
129	TAT INSECT REPELLENT	2 OUNCES

131	BLACK FLAG	2 OUNCES
132	JITTER BUG INSECT REPELLENT	2 OUNCES
134	CROSS CONTRY GARDEN SPRAY	6 OUNCES
157	INSECT REPELLENT	3 OUNCES
158	RED ARROW GARDEN SPRAY	2 OUNCES

UNKNOWNNS

018	GLASS BOTTLE	1/2 GALLONS
019	METAL CONTAINER	1 GALLON
020	METAL CONTAINER	1 BALLON
058	GLASS BOTTLE	1 QUART
149	GLASS BOTTLE	1/2 PINT
159	PLASTIC CONTAINER	5 GALLON
160	PLASTIC CONTAINER	5 GALLON



FIGURE 6.1
WASTE CONTAINER
B-25 (10 GA) CONTAINER

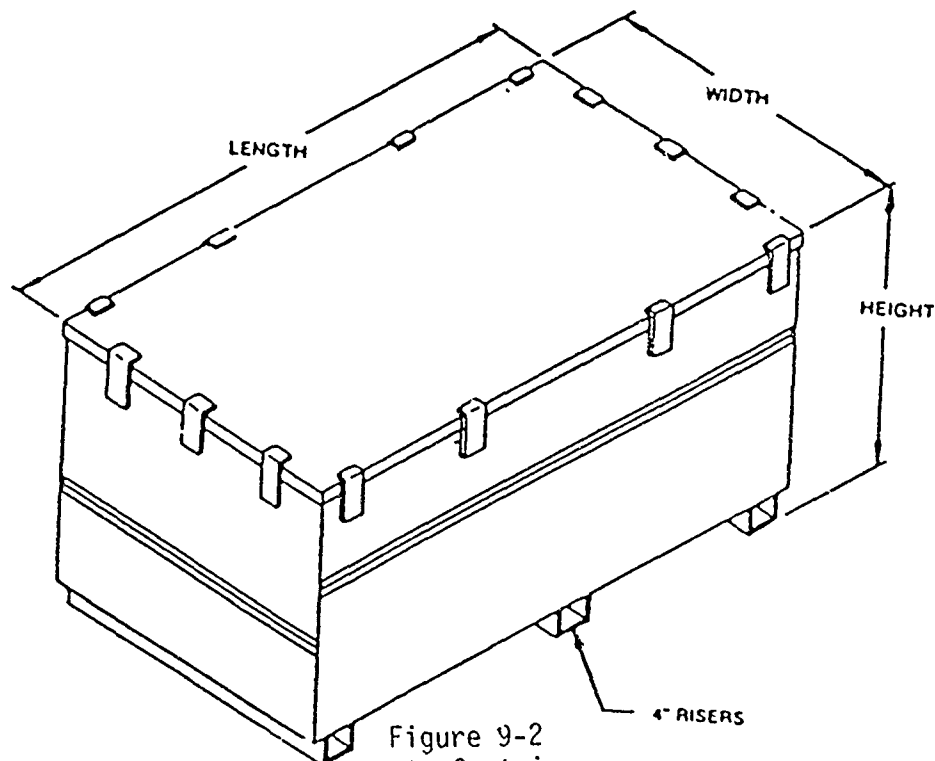
Dimensions (inches)	Interior	Exterior
Height	47	51.5
Width	46	47
Length	72	73

Description

Classification	-Strong Tight Container
Package Type	-Container
Capacity	-90 cu ft
Material	-10 ga. ASTM A569 low carbon hot rolled steel
Gross wt. (empty)	-895 lbs.
Payload	-10,000 lbs.
Max. Loaded wt.	-10,895 lbs.

Additional Information

- o Meets strong tight container requirements for LSA material.
- o Exclusive "seal-loc" positive closure system to preclude inadvertent opening.
- o Optional removable risers.
- o Optional anti-springback for compaction systems.
- o Final protective finish to meet customer requirements.



(3331P)

Figure 9-2
Waste Container
9-17

FIGURE 9-3
Radioactive Soil Shipment Data

Information provided by Chem-Nuclear Systems Inc.
Lansdowne Project Site

-SOIL-	SHPMT DATE	SHPMT-#	#BOXES	GROSS-WT	NET-WT	TONS	WASTE-CUBFT	WST-DENSITY LBS/CUBFT3
	11-29-88	RW-025	3	34115	31562	15.7810	282.90	116.90
	11-29-88	RW-026	3	34025	31472	15.7360	282.90	116.56
	11-30-88	RW-027	3	35400	32847	16.4235	282.90	121.66
	11-30-88	RW-028	4	44920	41516	20.7580	377.20	115.32
	12-02-88	RW-029	4	45410	41988	20.9940	377.20	116.63
	12-02-88	RW-030	4	45145	41741	20.8705	377.20	115.95
	12-02-88	RW-031	4	45025	41621	20.8105	377.20	115.61
	12-03-88	RW-032	4	44415	40975	20.4875	377.20	113.82
	12-03-88	RW-033	4	41725	38285	19.1425	377.20	106.35
	12-03-88	RW-034	4	41205	37765	18.8825	377.20	104.90
	12-03-88	RW-035	4	40865	37425	18.7125	377.20	103.96
	12-05-88	RW-036	4	42365	38925	19.4625	377.20	108.13
	12-05-88	RW-037	4	42215	38775	19.3875	377.20	107.71
	12-05-88	RW-038	4	42760	39320	19.6600	377.20	109.22
	12-06-88	RW-039	4	41270	37830	18.9150	377.20	105.08
	12-06-88	RW-040	4	45195	41755	20.8775	377.20	115.99
	12-06-88	RW-041	4	45415	41975	20.9875	377.20	116.60
	12-06-88	RW-042	4	44040	40600	20.3000	377.20	112.78
	12-07-88	RW-043	4	43730	40322	20.1610	377.20	112.01
	12-07-88	RW-044	4	44165	40789	20.3945	377.20	113.30
	12-07-88	RW-045	4	41265	37889	18.9445	377.20	105.25
	12-07-88	RW-046	4	45640	42264	21.1320	377.20	117.40
	12-08-88	RW-047	4	42760	39384	19.6920	377.20	109.40
	12-08-88	RW-048	4	43885	40509	20.2545	377.20	112.53
	12-08-88	RW-049	4	44955	41579	20.7895	377.20	115.50
	12-08-88	RW-050	4	42850	39474	19.7370	377.20	109.65
	12-09-88	RW-051	4	41420	38044	19.0220	377.20	105.68
	12-09-88	RW-052	4	40655	37279	18.6395	377.20	103.55
	12-09-88	RW-053	4	39870	36494	18.2470	377.20	101.37
	12-09-88	RW-054	4	40295	36919	18.4595	377.20	102.55
	12-09-88	RW-055	4	40005	36621	18.3105	377.20	101.73
	12-10-88	RW-056	4	42200	38808	19.4040	377.20	107.80
	12-10-88	RW-057	4	41795	38403	19.2015	377.20	106.68
	12-10-88	RW-058	4	41850	38458	19.2290	377.20	106.83
	12-10-88	RW-059	4	43430	40038	20.0190	377.20	111.22
	12-10-88	RW-060	4	41525	38133	19.0665	377.20	105.93
	12-11-88	RW-061	4	42845	39453	19.7265	377.20	109.59
	12-11-88	RW-062	4	44865	41473	20.7365	377.20	115.20
	12-11-88	RW-063	4	42970	39578	19.7890	377.20	109.94
	12-11-88	RW-064	4	43370	39978	19.9890	377.20	111.05
	12-12-88	RW-065	4	44375	40923	20.4615	377.20	113.68
	12-12-88	RW-066	4	43330	39878	19.9390	377.20	110.77
	12-13-88	RW-067	4	43430	39978	19.9890	377.20	111.05
	12-12-88	RW-068	4	43050	39598	19.7990	377.20	109.99
	12-12-88	RW-069	4	42545	39093	19.5465	377.20	108.59
	12-13-88	RW-070	4	40720	37268	18.6340	377.20	103.52
	12-14-88	RW-071	4	40475	37023	18.5115	377.20	102.84
	12-14-88	RW-072	4	40075	36623	18.3115	377.20	101.73
	12-14-88	RW-073	4	40480	37028	18.5140	377.20	102.86
	12-15-88	RW-074	4	39900	36448	18.2240	377.20	101.24
	12-15-88	RW-075	4	41160	37708	18.8540	377.20	104.74

12-16-88	RW-076	3	21020	20160	10.0800	282.90	74.67
	Total < 1000 Tn	204.00	2172415.00	1999994.00	1000.00	19237.20	108.93
12-16-88	RW-076	2	20919	20059	10.0295	188.60	111.44
12-16-88	RW-077	4	40875	37435	18.7175	377.20	103.99
12-17-88	RW-078	4	39305	35825	17.9125	377.20	99.51
12-17-88	RW-079	5	45450	41100	20.5500	471.50	91.33
12-19-88	RW-080	5	44410	40110	20.0550	471.50	89.13
12-19-88	RW-081	5	44910	40610	20.3050	471.50	90.24
12-20-88	RW-082	4	40255	36815	18.4075	377.20	102.26
12-20-88	RW-083	4	40790	37350	18.6750	377.20	103.75
12-20-88	RW-084	4	39075	35635	17.8175	377.20	98.99
12-20-88	RW-085	4	41330	37890	18.9450	377.20	105.25
12-21-88	RW-086	4	41685	38245	19.1225	377.20	106.24
12-21-88	RW-087	4	39520	36080	18.0400	377.20	100.22
01-05-89	RW-088	4	39420	35980	17.9900	377.20	99.94
01-06-89	RW-089	4	38485	35045	17.5225	377.20	97.35
01-06-89	RW-090	4	39675	36235	18.1175	377.20	100.65
01-06-89	RW-091	4	39660	36220	18.1100	377.20	100.61
01-06-89	RW-092	4	37105	33665	16.8325	377.20	93.51
01-06-89	RW-093	4	40800	37360	18.6800	377.20	103.78
01-07-89	RW-094	4	37755	34315	17.1575	377.20	95.32
01-07-89	RW-095	4	40665	37225	18.6125	377.20	103.40
01-09-89	RW-096	4	39980	36540	18.2700	377.20	101.50
01-09-89	RW-097	4	37535	34095	17.0475	377.20	94.71
01-09-89	RW-098	5	44970	40640	20.3200	471.50	90.31
01-10-89	RW-102	3	25885	23305	11.6525	282.90	86.31
01-17-89	RW-103	4	41540	38100	19.0500	377.20	105.83
01-17-89	RW-104	4	41770	38330	19.1650	377.20	106.47
01-18-89	RW-105	4	42745	39305	19.6525	377.20	109.18
01-18-89	RW-106	4	42905	39465	19.7325	377.20	109.63
01-18-89	RW-107	4	37515	34075	17.0375	377.20	94.65
01-19-89	RW-108	4	38465	35025	17.5125	377.20	97.29
01-19-89	RW-109	4	42370	38930	19.4650	377.20	108.14
01-19-89	RW-110	4	44810	41370	20.6850	377.20	114.92
01-20-89	RW-111	4	43175	39735	19.8675	377.20	110.38
01-20-89	RW-112	4	43215	39775	19.8875	377.20	110.49
01-20-89	RW-113	4	44720	41280	20.6400	377.20	114.67
01-21-89	RW-114	4	44095	40655	20.3275	377.20	112.93
01-21-89	RW-115	4	43410	39970	19.9850	377.20	111.03
01-21-89	RW-116	4	43685	40245	20.1225	377.20	111.79
01-23-89	RW-117	4	43790	40350	20.1750	377.20	112.08
01-23-89	RW-118	4	43480	40040	20.0200	377.20	111.22
01-23-89	RW-119	4	44055	40615	20.3075	377.20	112.82
01-23-89	RW-120	4	40075	36635	18.3175	377.20	101.76
01-24-89	RW-121	4	37750	34310	17.1550	377.20	95.31
01-24-89	RW-122	4	38380	34940	17.4700	377.20	97.06
01-24-89	RW-123	4	39745	36305	18.1525	377.20	100.85
01-25-89	RW-124	4	42055	38615	19.3075	377.20	107.26
01-25-89	RW-125	4	39945	36505	18.2525	377.20	101.40
01-25-89	RW-126	4	44265	40825	20.4125	377.20	113.40
01-26-89	RW-127	4	42210	39770	19.8850	377.20	110.47
01-26-89	RW-128	3	31085	28505	14.2525	282.90	105.57
01-26-89	RW-129	4	42705	39265	19.6325	377.20	109.07
01-27-89	RW-130	4	43045	39605	19.8025	377.20	110.01
01-27-89	RW-131	4	43895	40455	20.2275	377.20	112.38
01-28-89	RW-132	4	44410	40970	20.4850	377.20	113.81

01-28-89	RW-133	4	45980	42540	21.2700	377.20	118.17
01-28-89	RW-134	4	46060	42620	21.3100	377.20	118.39
01-28-89	RW-135	4	43565	40125	20.0625	377.20	111.46
01-30-89	RW-136	4	44810	41370	20.6850	377.20	114.92
01-30-89	RW-137	4	45605	42160	21.0800	377.20	117.11
01-31-89	RW-138	4	45930	42485	21.2425	377.20	118.01
02-01-89	RW-139	2	23230	21505	10.7525	188.60	119.47
02-01-89	RW-157	1	11240	10380	5.1900	94.30	115.33
01-30-89	RW-159	2	21450	19730	9.8650	188.60	109.61
01-31-89	RW-160	4	43555	40115	20.0575	377.20	111.43
02-01-89	RW-163	4	42845	39405	19.7025	377.20	109.46
02-02-89	RW-164	3	33695	31115	15.5575	282.90	115.24
03-01-89	RW-165	2	22565	20845	10.4225	188.60	115.81
03-02-89	RW-166	2	22840	21120	10.5600	188.60	117.33
03-02-89	RW-167	4	44450	41010	20.5050	377.20	113.92
03-03-89	RW-169	2	18715	16995	8.4975	188.60	94.42
03-03-89	RW-171	4	39800	36360	18.1800	377.20	101.00
03-07-89	RW-172	1	9775	8915	4.4575	94.30	99.06
03-07-89	RW-173	1	9870	9010	4.5050	94.30	100.11
03-08-89	RW-174	2	18980	17260	8.6300	188.60	95.89
03-09-89	RW-175	4	30395	27815	13.9075	377.20	77.26
03-09-89	RW-176	2	20445	18725	9.3625	188.60	104.03
03-10-89	RW-177	4	43540	40100	20.0500	377.20	111.39
03-10-89	RW-179	2	19095	17375	8.6875	188.60	96.53
03-10-89	RW-180	2	20705	18985	9.4925	188.60	105.47
03-10-89	RW-182	2	19660	17940	8.9700	188.60	99.67
03-11-89	RW-183	2	21100	19380	9.6900	188.60	107.67
03-11-89	RW-184	2	20770	19050	9.5250	188.60	105.83
03-13-89	RW-185	2	19480	17760	8.8800	188.60	98.67
03-13-89	RW-186	1	10355	9495	4.7475	94.30	105.50
03-14-89	RW-187	4	38935	35495	17.7475	377.20	98.60
03-14-89	RW-188	1	9425	8565	4.2825	94.30	95.17
03-14-89	RW-189	1	9615	8755	4.3775	94.30	97.28
03-14-89	RW-190	4	38095	34655	17.3275	377.20	96.26
03-14-89	RW-191	4	36275	32835	16.4175	377.20	91.21
03-15-89	RW-192	4	36355	32915	16.4575	377.20	91.43
03-15-89	RW-193	4	36515	33075	16.5375	377.20	91.88
03-15-89	RW-194	5	46295	41995	20.9975	471.50	93.32
03-15-89	RW-196	5	45235	40935	20.4675	471.50	90.97
03-15-89	RW-197	4	39385	35945	17.9725	377.20	99.85
03-16-89	RW-199	1	9420	8560	4.2800	94.30	95.11
03-16-89	RW-200	4	38550	35110	17.5550	377.20	97.53
03-16-89	RW-201	4	40465	37025	18.5125	377.20	102.85
03-17-89	RW-202	4	40000	36560	18.2800	377.20	101.56
03-17-89	RW-203	4	36445	33005	16.5025	377.20	91.68
03-17-89	RW-204	4	39060	35620	17.8100	377.20	98.94
03-17-89	RW-205	3	30300	27720	13.8600	282.90	102.67
03-18-89	RW-208	4	39110	35670	17.8350	377.20	99.08
03-18-89	RW-209	4	39060	35620	17.8100	377.20	98.94
03-20-89	RW-213	3	32745	30165	15.0825	282.90	111.72
03-20-89	RW-214	4	42595	39155	19.5775	377.20	108.76
03-20-89	RW-215	4	42945	39505	19.7525	377.20	109.74
03-21-89	RW-216	4	42225	38785	19.3925	377.20	107.74
03-21-89	RW-217	4	41710	38270	19.1350	377.20	106.31
03-23-89	RW-218	4	42425	38985	19.4925	377.20	108.29
03-23-89	RW-219	4	41185	37745	18.8725	377.20	104.85

03-27-89	RW-220	4	42695	39255	19.6275	377.20	109.04
03-27-89	RW-221	4	40595	37155	18.5775	377.20	103.21
03-27-89	RW-222	4	40885	37445	18.7225	377.20	104.01
03-27-89	RW-223	3	29905	27325	13.6625	282.90	101.20
03-28-89	RW-224	4	41835	38395	19.1975	377.20	106.65
03-28-89	RW-225	4	41500	38060	19.0300	377.20	105.72
03-28-89	RW-226	4	40325	36885	18.4425	377.20	102.46
03-28-89	RW-227	4	40970	37530	18.7650	377.20	104.25
03-29-89	RW-228	4	41970	38500	19.2500	377.20	106.94
03-29-89	RW-229	4	36405	32965	16.4825	377.20	91.57
03-29-89	RW-230	4	40175	36735	18.3675	377.20	102.04
03-30-89	RW-231	4	40910	37470	18.7350	377.20	104.08
03-30-89	RW-232	4	40605	37165	18.5825	377.20	103.24
03-30-89	RW-233	3	29430	26850	13.4250	282.90	99.44
03-31-89	RW-234	4	39505	36065	18.0325	377.20	100.18
03-31-89	RW-235	4	41960	38520	19.2600	377.20	107.00
03-31-89	RW-236	4	41200	37760	18.8800	377.20	104.89
03-31-89	RW-237	4	41080	37640	18.8200	377.20	104.56
03-31-89	RW-238	4	41155	37715	18.8575	377.20	104.76
04-01-89	RW-239	4	42005	38565	19.2825	377.20	107.13
04-03-89	RW-240	4	40395	36955	18.4775	377.20	102.65
04-03-89	RW-241	4	41575	38135	19.0675	377.20	105.93
04-01-89	RW-242	4	41560	38120	19.0600	377.20	105.89
04-03-89	RW-243	4	39295	35855	17.9275	377.20	99.60
04-01-89	RW-244	4	41480	38040	19.0200	377.20	105.67
04-01-89	RW-245	4	41285	37845	18.9225	377.20	105.13
04-03-89	RW-246	4	41495	38055	19.0275	377.20	105.71
04-04-89	RW-247	4	41400	37960	18.9800	377.20	105.44
04-04-89	RW-248	4	40545	37105	18.5525	377.20	103.07
04-04-89	RW-249	4	45155	40855	20.4275	377.20	113.49
04-04-89	RW-250	4	42140	38700	19.3500	377.20	107.50
04-04-89	RW-251	5	41540	37240	18.6200	471.50	82.76
04-05-89	RW-252	4	41765	38325	19.1625	377.20	106.46
04-06-89	RW-253	4	42910	39470	19.7350	377.20	109.64
04-07-89	RW-254	4	42045	38605	19.3025	377.20	107.24
04-07-89	RW-255	4	42190	38750	19.3750	377.20	107.64
04-10-89	RW-256	4	43820	40380	20.1900	377.20	112.17
04-10-89	RW-257	4	41925	38485	19.2425	377.20	106.90
04-10-89	RW-258	3	29645	27065	13.5325	282.90	100.24
04-10-89	RW-259	4	42640	39200	19.6000	377.20	108.89
04-10-89	RW-260	3	31000	28430	14.2150	282.90	105.30
04-10-89	RW-261	4	41750	38310	19.1550	377.20	106.42
04-13-89	RW-262	3	25055	22475	11.2375	282.90	83.24
04-20-89	RW-263	5	42410	38110	19.0550	471.50	84.69
04-20-89	RW-264	5	42610	38310	19.1550	471.50	85.13
04-20-89	RW-265	6	44890	39730	19.8650	565.80	73.57
04-21-89	RW-266	6	44850	39690	19.8450	565.80	73.50
04-21-89	RW-267	5	40005	35705	17.8525	471.50	79.34
04-21-89	RW-268	6	45630	40470	20.2350	565.80	74.94
04-22-89	RW-269	5	45520	41220	20.6100	471.50	91.60
04-22-89	RW-270	5	45320	41020	20.5100	471.50	91.16
04-24-89	RW-271	5	45360	41060	20.5300	471.50	91.24
04-24-89	RW-272	5	44880	40580	20.2900	471.50	90.18
04-24-89	RW-273	4	41265	37825	18.9125	377.20	105.07
04-24-89	RW-274	4	42080	38640	19.3200	377.20	107.33
04-24-89	RW-275	4	42945	39505	19.7525	377.20	109.74

04-25-89	RW-276	3	28015	25435	12.7175	282.90	94.20
04-25-89	RW-277	4	41905	38465	19.2325	377.20	106.85
04-25-89	RW-278	4	42820	39380	19.6900	377.20	109.39
04-25-89	RW-279	4	42490	39050	19.5250	377.20	108.47
04-26-89	RW-280	4	39910	36470	18.2350	377.20	101.31
04-26-89	RW-281	4	41360	37920	18.9600	377.20	105.33
04-26-89	RW-282	4	41805	38360	19.1800	377.20	106.56
04-27-89	RW-283	4	40500	37060	18.5300	377.20	102.94
04-27-89	RW-284	4	40280	36840	18.4200	377.20	102.33
05-04-89	RW-285	3	26470	23890	11.9450	282.90	88.48
05-04-89	RW-286	5	44790	40490	20.2450	471.50	89.98
05-04-89	RW-287	3	26585	24005	12.0025	282.90	88.91
06-06-89	RW-288	4	34425	30985	15.4925	377.20	86.07
06-06-89	RW-289	4	34745	31305	15.6525	377.20	86.96
06-06-89							
	ALL SOIL						
	GRAND TOTAL	833.00	8974644.00	8219983.00	4109.9915	83266.90	103.44

FIGURE 9-4
Radioactive Rubble Shipment Data

CHEM-NUCLEAR SYSTEMS
LAHSDOWNE PROJECT
RUBBLE-SLAB DISPOSAL DATA

SHIP DATE	SHIPMT-#	#BOXES	GROSS-WT	NET-WT	TONS	WASTE-CUBFT	WT-DENSITY LBS/CUBFT3
09-08-88	RW-001	10	43614	34892	17.4460	943.00	38.77
09-13-88	RW-002	10	44775	36111	18.0555	943.00	40.12
09-16-88	RW-003	12	41574	31182	15.5910	1131.60	28.87
09-30-88	RW-004	12	45020	34534	17.2670	1131.60	31.98
10-04-88	RW-005	11	43650	34010	17.0050	1037.30	34.35
10-08-88	RW-006	13	41280	30100	15.0500	1225.90	25.73
10-13-88	RW-007	14	39710	27670	13.8350	1320.20	21.96
10-22-88	RW-008	10	44505	36148	18.0740	943.00	40.16
10-28-88	RW-009	8	44990	38326	19.1630	754.40	53.23
10-28-88	RW-010	9	44860	37363	18.6815	848.70	46.13
11-04-88	RW-011	8	45560	38735	19.3675	754.40	53.80
11-04-88	RW-012	6	44560	39447	19.7235	565.80	73.05
11-08-88	RW-013	7	45140	39148	19.5740	660.10	62.14
11-08-88	RW-014	6	45515	40379	20.1895	565.80	74.78
11-08-88	RW-015	6	42880	37744	18.8720	565.80	69.90
11-11-88	RW-016	6	43225	38089	19.0445	565.80	70.54
11-11-88	RW-017	6	44295	39159	19.5795	565.80	72.52
11-11-88	RW-018	6	45340	40204	20.1020	565.80	74.45
11-18-88	RW-019	7	45170	39193	19.5965	660.10	62.21
11-18-88	RW-020	6	44750	39644	19.8220	565.80	73.41
11-18-88	RW-021	7	45310	39353	19.6765	660.10	62.47
11-23-88	RW-022	6	41685	36579	18.2895	565.80	67.74
11-23-88	RW-023	6	45090	39984	19.9920	565.80	74.04
11-23-88	RW-024	6	45345	40239	20.1195	565.80	74.52
11-29-88	RW-025	1	8695	7844	3.9220	94.30	87.16
11-29-88	RW-026	1	8355	7504	3.7520	94.30	83.38
11-30-88	RW-027	1	8525	7674	3.8370	94.30	85.27
01-13-89	RW-099	8	45020	38090	19.0450	754.40	52.90
01-14-89	RW-100	7	43630	37610	18.8050	660.10	59.70
01-14-89	RW-101	7	43365	37170	18.5850	660.10	59.00
01-17-89	RW-102	3	17765	15185	7.5925	282.90	56.24
01-19-89	RW-107	1	4810	3950	1.9750	94.30	43.89
01-26-89	RW-128	2	12970	11250	5.6250	188.60	62.50
02-02-89	RW-139	3	20385	17805	8.9025	282.90	65.94
02-07-89	RW-140	6	41990	36830	18.4150	565.80	68.20
02-07-89	RW-141	6	44880	39720	19.8600	565.80	73.56
02-09-89	RW-142	7	43950	37930	18.9650	660.10	60.21
02-09-89	RW-143	6	42960	37800	18.9000	565.80	70.00
02-09-89	RW-144	6	42425	37265	18.6325	565.80	69.01
02-10-89	RW-145	7	45340	39320	19.6600	660.10	62.41
02-15-89	RW-146	7	44755	38735	19.3675	660.10	61.48
02-15-89	RW-147	7	41940	36755	18.3775	660.10	58.34
02-18-89	RW-148	7	45020	39070	19.5350	660.10	62.02
02-18-89	RW-149	7	44735	38715	19.3575	660.10	61.45
02-21-89	RW-150	6	44840	39680	19.8400	565.80	73.48
02-21-89	RW-151	6	45015	39855	19.9275	565.80	73.81
02-24-89	RW-152	6	44930	39770	19.8850	565.80	73.65
02-24-89	RW-153	6	43060	37900	18.9500	565.80	70.19
02-27-89	RW-154	7	44595	38575	19.2875	660.10	61.23
02-27-89	RW-155	6	42920	37760	18.8800	565.80	69.93

	02-28-89	RW-156	5	43730	39430	19.7150	471.50	87.62
	03-01-89	RW-157	4	32930	29490	14.7450	377.20	81.92
	03-01-89	RW-158	2	14488	13085	6.5425	188.60	72.69
<885Tons			346	2065866	1770000	885	32627.8	56.84
	03-01-89	RW-158	3	29917	27020	13.5100	282.90	100.07
	03-02-89	RW-159	3	23100	20520	10.2600	282.90	76.00
	03-02-89	RW-161	5	44530	40230	20.1150	471.50	89.40
	03-03-89	RW-162	5	44080	39780	19.8900	471.50	88.40
	03-03-89	RW-164	1	9490	8630	4.3150	94.30	95.89
	03-07-89	RW-165	2	18560	16840	8.4200	188.60	93.56
	03-07-89	RW-166	2	19365	17645	8.8225	188.60	98.03
	03-08-89	RW-168	5	44825	40525	20.2625	471.50	90.06
	03-09-89	RW-169	3	25525	22945	11.4725	282.90	84.98
	03-09-89	RW-170	5	44250	39950	19.9750	471.50	88.78
	03-09-89	RW-172	3	29040	26460	13.2300	282.90	98.00
	03-09-89	RW-173	3	28965	26385	13.1925	282.90	97.72
	03-09-89	RW-174	2	19955	18235	9.1175	188.60	101.31
	03-09-89	RW-175	1	10300	9440	4.7200	94.30	104.89
	03-10-89	RW-176	2	20900	19180	9.5900	188.60	106.56
	03-10-89	RW-178	4	39675	36235	18.1175	377.20	100.65
	03-10-89	RW-179	2	20335	18615	9.3075	188.60	103.42
	03-10-89	RW-180	2	20600	18880	9.4400	188.60	104.89
	03-11-89	RW-181	4	40905	37465	18.7325	377.20	104.07
	03-11-89	RW-182	2	20915	19195	9.5975	188.60	106.64
	03-13-89	RW-183	2	20095	18375	9.1875	188.60	102.08
	03-13-89	RW-184	2	20870	19150	9.5750	188.60	106.39
	03-13-89	RW-185	2	20650	18930	9.4650	188.60	105.17
	03-14-89	RW-186	3	31090	28510	14.2550	282.90	105.59
	03-14-89	RW-188	3	28390	25810	12.9050	282.90	95.59
	03-14-89	RW-189	3	28865	26280	13.1400	282.90	97.33
	03-14-89	RW-191	1	9365	8505	4.2525	94.30	94.50
	03-14-89	RW-192	1	9375	8515	4.2575	94.30	94.61
	03-15-89	RW-193	1	9185	8325	4.1625	94.30	92.50
	03-15-89	RW-195	4	38985	35545	17.7725	377.20	98.74
	03-15-89	RW-198	4	39010	35570	17.7850	377.20	98.81
	03-16-89	RW-199	3	31285	28705	14.3525	282.90	106.31
	03-16-89	RW-203	1	8450	7590	3.7950	94.30	84.33
	03-16-89	RW-205	1	9770	8910	4.4550	94.30	99.00
	03-17-89	RW-206	4	40080	36640	18.3200	377.20	101.78
	03-17-89	RW-207	4	41190	37750	18.8750	377.20	104.86
	03-20-89	RW-210	4	41555	38115	19.0575	377.20	105.88
	03-20-89	RW-211	4	43305	39865	19.9325	377.20	110.74
	03-20-89	RW-212	4	42100	38660	19.3300	377.20	107.39
	03-21-89	RW-213	1	11025	10165	5.0825	94.30	112.94
	03-22-89	RW-223	1	10215	9355	4.6775	94.30	103.94
	03-22-89	RW-229	1	9545	8685	4.3425	94.30	96.50
	03-22-89	RW-233	1	9700	8840	4.4200	94.30	98.22
	03-22-89	RW-249	1	8115	7255	3.6275	94.30	80.61
	03-29-89	RW-258	1	9015	8155	4.0775	94.30	90.61
	03-31-89	RW-260	1	9960	9100	4.5500	94.30	101.11
	03-31-89	RW-262	2	17615	15895	7.9475	188.60	88.31
	04-07-89	RW-262	2	15210	13490	6.7450	188.60	74.94
	04-13-89	RW-276	2	15210	13490	6.7450	188.60	74.94
	04-13-89	RW-285	2	15755	14035	7.0175	188.60	77.97
	04-20-89	RW-287	2	10490	8770	4.3850	188.60	48.72

04-20-89	RW-288	1	3200	2340	1.1700	94.30	26.00
Grand Total Rubble:		474	3279768	2873500	1436.7500	44698.2	67.36

Shipment Date	Contents	#Containers	Total Container Weight
06-8-89 ⁽¹⁾	Flammable Liquid	5	380 lbs.
	Flammable Solid	1	5 lbs.
	Corrosive Material	1	10 lbs.
	Poison B	1	75 lbs.
06-13-89 ⁽²⁾	Flammable Compressed Gas	2	10 lbs.
	Non-flammable Comp. Gas	1	5 lbs.
06-30-89 ⁽²⁾	Flammable Liquid	<u>1</u>	<u>5 lbs.</u>
	Total	12	585 lbs.

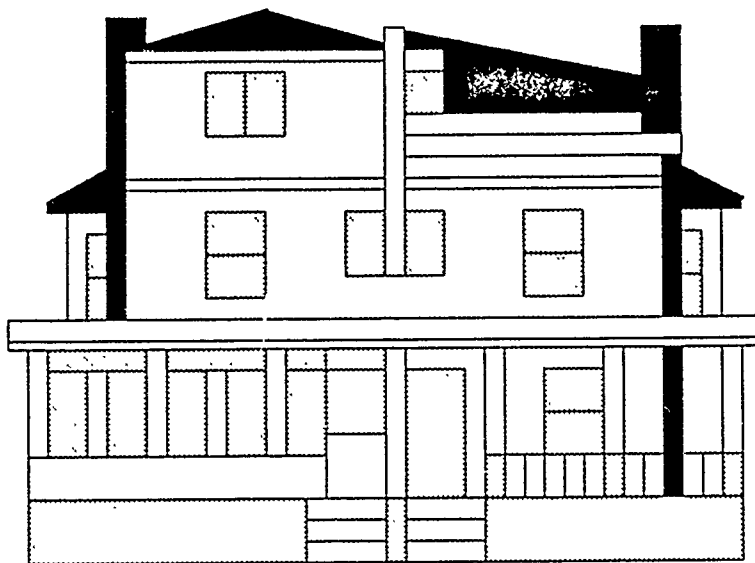
Notes:

- 1) Transported for disposal at GSX Services, Inc.
Reidsville, NC.
- 2) Transported for disposal at GSX Services, Inc.
Laurel, MD.

Figure 9-5

<u>Shipment Date</u> <u>Yd.</u>	<u>Shipment No</u>	<u>Net Wt.</u>	<u>Tons</u>	<u>Cubic Yds.</u>	<u>Density Lbs/Cubic</u>
8-18-88	1	7,880	3.94	20	394.0
8-18-88	2	8,900	4.45	25	356.0
8-19-88	3	7,540	3.77	25	301.6
8-19-88	4	7,840	3.92	20	392.0
8-22-88	5	12,080	6.04	25	483.2
8-22-88	6	11,800	5.90	<u>20</u>	<u>590.0</u>
TOTAL	6	56,040	28.02	135	415.1

Figure 9-6



LANSDOWNE

**RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT**

OPERATIONS CLOSEOUT REPORT

***CHEM-NUCLEAR SYSTEMS, INC.
220 STONERIDGE DRIVE
COLUMBIA, SOUTH CAROLINA***

**CHAPTER 10
RESTORATION**

CHAPTER 10

RESTORATION

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LANSDOWNE RADIOACTIVE RESIDENCE COMPLEX
DISMANTLEMENT/REMOVAL PROJECT

OPERATIONS CLOSEOUT REPORT

CHAPTER 10

RESTORATION

1.0 INTRODUCTION

Following remediation activities including final release surveys, Chem-Nuclear undertook restoration to return the project site to a useable state. This was accomplished in several phases due to the need to maintain site access, continue use of facilities and services and to best utilize project manpower and resources. During this process, it was also necessary to negotiate changes resulting from the removal of structures which had not been included in the original scope of work. This chapter addresses those activities required to restore the site as specified by original contract and approved change criteria.

2.0 DECONTAMINATION AND SURVEYS

2.1 EARTHEN AREAS

Radiological verification of earthen areas was conducted on an ongoing basis throughout the excavation process. In addition, upon completion of soil excavation, final reviews of collected data, reverification of selected areas and random checks of portions of the site were conducted to ensure remediation was complete. Earthen areas were then released from radiological controls and restoration commenced.

2.2 PAVED AREAS

Prior to restoration of paved areas, final surveys of underlying soil areas and remaining paved or concreted areas were performed. Upon completion of data verification, areas were released for restoration.

2.3 SEWER AREAS

Final surveys for release of the sewer areas was accomplished in two phases. The first phase consisted of those areas which were required for installation of the new sewer line and manhole prior to the removing the existing sewer line from service. The second phase consisted of release surveys following removal of contaminated sewer materials and soil. Surveys for release of the sewer excavation were conducted in the same manner as for all other soil areas on site. Following successful release of these areas, the sewer excavation was released for restoration activities.

2.4 FACILITIES, EQUIPMENT AND MATERIALS

Prior to release of any equipment or materials from the radiologically controlled area, detailed cleaning, surveying and decontamination were performed. This included hand tools, heavy equipment, unused materials, and remaining protective clothing. In addition, all temporary office trailers, the Operations Support Facility, the guard shack and associated facilities were surveyed for contamination prior to return.

3.0 REMOVAL OF FACILITIES

3.1 ANL MOBILE LABORATORY

On February 16, 1989, the Argonne National Laboratory mobile laboratory was removed from its location on the street to the driveway at 117 E. Stratford Avenue. It remained at this location until utilization was completed on June 19, 1989.

3.2 CNSI OFFICE TRAILER

In order to obtain access to the sewer area and the street, the CNSI office trailer was removed from site on February 20, 1989

and returned to the supplier. CNSI office functions were relocated to the residence at 117 E. Stratford Avenue.

3.3 OPERATIONS SUPPORT FACILITY

On April 3 and 4, 1989, the Operations support facility was disassembled in preparation for start of sewer remediation. Following decontamination and radiological surveys, it was shipped off site. The asphalt cold patch base was surveyed and areas of surficial contamination removed. The asphalt material was then released to the Borough of Upper Darby for use.

3.4 ENVIRONMENTAL MONITORS

Following release of earthen areas from radiological controls, the environmental continuous air monitors were taken out of service on May 1, 1989.

3.5 PERIMETER FENCING

Final removal of the site perimeter chain link fencing, gates and temporary portions of fencing was performed on May 2, 1989.

3.6 CREW BREAK TRAILER

In order to permit access to the portions of the street and sidewalks on the north side of E. Statford Avenue, the crew break trailer was relocated to the south side of the street on May 3, 1989. Removal from the project site and return to the vendor was accomplished on May 15, 1989.

3.7 GUARD SHACK

On May 25, 1989, the security guard shack was released and removed from the site.

3.8 VIDEO CAMERA SYSTEM

On June 6, 1989, concurrent with removal of the U.S. Army Corps of Engineers office trailer, and with the approval of the Corps On-Site Representative, the video camera/recording system was removed from service. As required by contract, the recorder, monitor and all tapes were retained by the Government. All other materials and equipment were returned to Chem-Nuclear.

3.9 U.S. ARMY CORPS OF ENGINEERS OFFICE TRAILER

On June 6, 1989, the U.S. Army Corps of Engineers site office was relocated to the residence at 117 E. Stratford Avenue. The office trailer was then removed and returned to the supplier.

3.10 FINAL OFFICE CLOSEOUT

On July 25, 1989, the offices in the residence at 117 E. Stratford Avenue were vacated by Chem-Nuclear and the U.S. Army Corps of Engineers On-Site Representative and final demobilization from the project completed.

4.0 SEWER RESTORATION

4.2 START OF SEWER MAIN INSTALLATION

On April 1, 1989, concurrent with radiological release of portions of the sewer trench necessary for placement of the new sewer main, the manhole at the juncture of E. Stratford Avenue and N. Union Avenue was breached. Vitrified clay sewer pipe placement then began with placement and grouting of the first section into the manhole area. Installation and bedding of new piping sections continued until April 6, 1989, when work was suspended due to excessive intrusion of groundwater into the excavation. This resulted in siltation, deterioration of the pipe bedding and slumping of installed sections.

4.3 FRENCH DRAIN INSTALLATION

In order to resolve problems due to the groundwater intrusion, the U.S. Army Corps of Engineers requested the installation of a French drain system around the new sewer main. This system consisted of filter cloth in contact with the trench base, aggregate base placed beneath and beside the new sewer piping, a minimum of six inches of aggregate above the pipe and the filter cloth wrapped up and around the aggregate. Because the old sewer main was still in place, the initial placement consisted of the filter cloth, the aggregate pipe bedding and sufficient aggregate along the piping to assure stability. Installation of this portion of the sewer main and French drain was conducted on April 17 and 18, 1989.

4.4 NEW MANHOLE INSTALLATION

Following tie-in of the new sewer main piping to the upstream, uncontaminated main on April 18, 1989, a concrete base for the new manhole on E. Stratford Avenue was placed. The precast manhole sections were then installed on April 20, 1989.

4.5 NEW SEWER MAIN ACCEPTANCE

Following installation of the new main, a visual inspection of the piping installation and a line-of-sight light test were performed by the U.S. Army Corps of Engineers On-Site Representative and the Borough of Lansdowne Engineer, Mr. Lloyd Noll. Due to the fact that laterals on the north side of E. Stratford Avenue had been placed in service, the new main had positive "O" ring seals and because it was impractical to perform static head or pressure leak tests, further testing was waived and the sewer main installation was accepted.

4.6 FINAL INSTALLATION

Concurrent with final removal of the old sewer main sections and soil remediation, the remaining lateral ties from residences on the south side were made and final placement of the aggregate and filter cloth for the French drain system was performed. These activities were accomplished between April 20, 1989 and April 24, 1989.

4.7 BACKFILL

Backfill and compaction of the sewer trench was performed on April 25, and 26, 1989. Due to unsuitability of excavated materials, backfill material was obtained from an approved borrow pit. At the request of the Borough of Lansdowne Engineer, Mr. Lloyd Noll, an 19 inch lift was placed over the French drain prior to initial compaction. Following compaction of the lift, subsequent lifts with a nominal loose thickness of 8 inches were placed and compacted. Compaction was accomplished using a Bomag MD-80 vibrating roller and a Wacker gasoline powered tamper. Density testing of compacted lifts was accomplished by the nuclear densitometry method by Pittsburgh Testing Laboratory personnel, with a required 95% maximum dry density for lifts below a 12 inch depth and 98% maximum dry density for the top 12 inches.

4.8 CONCRETE TRENCH CAP

Following acceptable compaction of the final backfill, the existing pavement was cut back one foot on both sides of the sewer excavation to a depth of 10 inches. An 8 inch cap of 3500 psi. concrete was placed over the entire trench area as a base for the paving. This work was performed on April 27, 1989, and May 1, 1989.

4.9 GAS LATERAL TILES

On April 28, 1989, PECO completed lateral gas service tie-ins to residences along E. Stratford Avenue and removed temporary service connections.

5.0 EARTHEN AREA RESTORATION

5.1 PREPARATION OF BASE

Following final verification surveys, preparations were made for start of backfill and compaction of the site. On May 4, 1989, through May 8, 1989, the existing base material was leveled and temporary truck and equipment access made from E. Stratford Avenue onto the site proper. Residual clean concrete rubble was, at the request of the U.S. Army Corps of Engineers, placed in the bottom of deep excavations. On May 8, 1989, a Hyster Model VR-7 vibrating roller was brought on site and compaction of the base begun.

5.2 BACKFILL MATERIAL

Material used as backfill was obtained from a previously approved borrow pit and transported to the project site. In addition to Standard Proctor tests to determine maximum dry density for compaction, radioisotopic analysis of fill samples was performed to assure that only uncontaminated materials were utilized. Base and fill material moisture levels were monitored to assure adequate compatibility. During the project, a total of 6,776.1 tons of fill material were placed, compacted and tested.

5.3 GARAGE FOUNDATION BASE PREPARATION

During the period of May 9, 1989, through May 23, 1989, concurrent with the main backfill of the site ,the base areas

for the footings for replacement garages at 100 and 112 E. Stewart Avenue were prepared. Due to the presence of unsuitable materials (clay) in the 110 garage area, the U.S. Army Corps of Engineers requested additional excavation of pre-existing, non-contaminated materials. A final excavation depth of eight and one-half feet below grade resulted. From this depth for the 110 garage, and from an as excavated depth of approximately three feet below grade for the 112 garage, backfill was placed in 8 inch nominal lifts followed by compaction. Density testing was performed by Pittsburgh Testing Laboratory personnel, with results as included in Appendix A. The criteria of 95% compaction for non-structural supporting areas or areas greater than 12 inches below structures and 98% for the upper 12 inches of structure supporting base material were applied.

5.4 SITE BACKFILL AND COMPACTION

From May 9, 1989 through June 2, 1989, backfill and compaction of the main portion of the site were conducted. As with the other areas of the project, fill was placed in nominal 8-inch (loose) lifts and compacted. For the main area of the project site, the density criteria of 95% maximum dry density was applied. Backfill continued to a final contour approved by the U.S. Army Corps of Engineers as shown in Drawing 83037, sheet 1 of 1, dated July 5, 1989.

5.5 WEATHER AFFECTS

During the backfill period, May 4, 1989, through June 2, 1989, twelve days were lost due to heavy rain and the resulting standing water and residual moisture. To the extent possible, standing water was removed by draining and pumping, then allowing natural drying to the desirable moisture level.

5.6 SEED BED PREPARATION AND SEEDING

Final treatment of earthen areas consisted of application of a 4-inch layer of clean topsoil over all previously excavated/backfilled areas, followed by fertilizing, lime application, seeding and mulching in accordance with contract specifications. In areas of potential erosion, specifically along the front bank and in the drainage area at the north-east corner, an erosion control blanket was placed and secured. This work was performed on the main portion of the site on June 12 through 17, 1989, along E. Stratford Avenue on June 13 and 14, 1989, and around the new garages on July 24 and 25, 1989. On October 12, 1989, Eagle Tree and Landscaping Service, the Chem-Nuclear Project Manager, and the U.S. Army Corps of Engineers On-Site Representative returned to Lansdowne to apply additional topsoil and re-seed the backyard at 114 E. Stewart Avenue, completing this activity.

6.0 PAVED AREA RESTORATION

6.1 SIDEWALKS AND CURBS - OFF SITE

During the conduct of project work, especially waste loadout and transport, damage which could be attributed to the project occurred at several locations off site. Damage consisted of cracking and deterioration of concrete sidewalks, which although previously damaged, were further aggravated by waste truck operations. Affected areas were removed and new concrete formed and placed. Sidewalks at the corner of E. Stratford Avenue and N. Union Avenue, at the corner of E. LaCrosse Avenue and N. Union Avenue, and at the corner of E. LaCrosse Avenue and N. Maple Avenue were completed on May 11, 1989. On June 3, 1989, the sidewalk and a portion of curb at the corner of E. Baltimore Avenue and N. Maple Avenue was replaced.

6.2 SIDEWALK AND CURB ON-SITE

Replacement of sidewalks and curbs removed during excavation of contaminated material consisted of backfilling of the excavation, compaction of the granular subgrade and forming and placing of concrete. Backfilling and compaction was conducted as part of the site backfilling as addressed in Section 5.0. On May 11, 1989, the sidewalk at 115 E. Stratford Avenue was replaced. Approximately 60% of the 105/107 E. Stratford Avenue sidewalk were replaced on May 22, 1989. The final portion of the 105/107 sidewalk and the associated curb were completed on June 3, 1989.

6.3 EAST STRATFORD AVENUE PAVING

On June 8, 1989, an asphalt binder course was placed for the areas of E. Stratford Avenue which had been excavated. The binder course was compacted and density tested. Final density tests yielded results which were in excess of 90% Standard Proctor, but which did not consistently meet the 95% compaction requirements. Because of the concrete sewer cap which was beneath the binder material and the full coverage wearing course above, the Borough Engineer, Mr. Lloyd Noll, and the U.S. Army Corps of Engineers On-Site Representative agreed to accept the binder course. On June 12, 1989, an asphalt wearing course was applied to the full width of E. Stratford Avenue, from the juncture at N. Maple Avenue. Although the contract only required resurfacing in the disturbed areas, Chem-Nuclear elected to pave the full area, rather than patch sections.

6.4 DRIVEWAYS AT 110 AND 112 E. STEWART AVENUE

Replacement of the driveways at the 110 and 112 E. Stewart Avenue residences was performed in conjunction with completion of garage construction. Foundation preparation consisted of removal of unsuitable clay and non-compactible materials,

followed by application of an aggregate base. In some areas, up to two feet of material was removed. Base preparation for the 112 E. Stewart Avenue driveway, sidewalk and street apron was made on June 22 through 28, 1989, followed by placing of concrete on June 29, 1989 and July 1 and 3, 1989. Concrete was 4 inches, minimum of 3,500 psi. concrete with welded wire mesh reinforcement. On July 18, 1989, a section of the 112 driveway was damaged by a concrete truck and affected sections were removed and replaced. Base preparations for the 110 driveway were made on July 6 through 18, 1989, with the new driveway poured in sections on July 10, 12, 15, and 18, 1989.

7.0 GARAGE CONSTRUCTION

7.1 FOUNDATION PREPARATION

Excavation for footers for both garages at 110 and 112 E. Stewart Avenue was made on June 6, 1989. Following excavation, the base was compacted and density testing performed to verify greater than 98% compaction. Following acceptance, footers for both garages were poured on June 5, 1989. The masonry foundations and aggregate slab bases were placed on June 8 and 12, 1989, followed by placing of the welded wire reinforced 3,500 psi. concrete floor slabs on June 13 and 19, 1989.

7.2 GARAGE FRAMING

Erection of the 110 garage frame began on June 14, 1989 and continued until June 30, 1989 when the garage was ready for application of the stucco exterior. The 112 garage structure was worked from June 20, 1989 through July 2, 1989 when it was ready for application of the stucco exterior. Garage construction was accomplished in a manner which provided residents with units which matched as closely as possible the original designs, but which met or exceeded present day building standards.

7.3 EXTERIOR FINISH

From June 29, 1989 through July 4, 1989, base and finish coats of stucco exterior were applied to both garages. On July 10, 1989, an inspection of the exteriors of both garages was performed and cracking and deterioration of the stucco finish was noted. As a result, Chem-Nuclear directed removal and replacement of the stucco exteriors. A second contractor was brought in and the rework accomplished on July 15 through 19, 1989. The finish (color) coat of the 112 garage which resulted did not match the exterior color of the residence, and at the request of the U.S. Army Corps of Engineers and the resident, the exterior was painted to match.

7.4 FINAL TRIM AND DEFICIENCY RESOLUTION

Final trim painting, installation of final hardware and cleanup of the garages was completed on July 21, 1989. Return of the residents' personal possessions to the garages from temporary storage was completed on July 20, 1989. Replacement of failed locks on both doors of the 112 garage was accomplished on October 20, 1989.

8.0 MISCELLANEOUS

8.1 FENCING

On June 22 and 27, 1989, replacement fencing was installed along the north boundary line of the 105 and 107 properties, at 60 N. Union Avenue and at 114 E. Stewart Avenue. Sections of the wooden stockade fence at 116 E. Stewart Avenue were also replaced.

8.2 YARD LIGHTING

On July 14, 1989, a replacement set of low voltage "Malibu" yard lights was provided to the resident at 112 E. Stewart Avenue in compensation for a similar set removed during soil excavation.

8.3 REPLACEMENT TREES AND SHRUBS

To compensate for foliage removed during the remediation of contaminated soil, replacement trees and shrubs were planted at several residences as follows.

- o 99 W. Stratford Avenue
One pink dogwood
One American holly
One purple lilac
- o 115 E. Stratford Avenue
One Japanese maple
- o 112 E. Stewart Avenue
One Japanese maple
Four arborvitae
- o 114 E. Stewart Avenue
Four Yews

Initial planting was made on July 24, 1989, with the exception of the pink dogwood which was planted on August 8, 1989. A replacement pink dogwood was planted on October 21, 1989 because of death of the initially planted one.

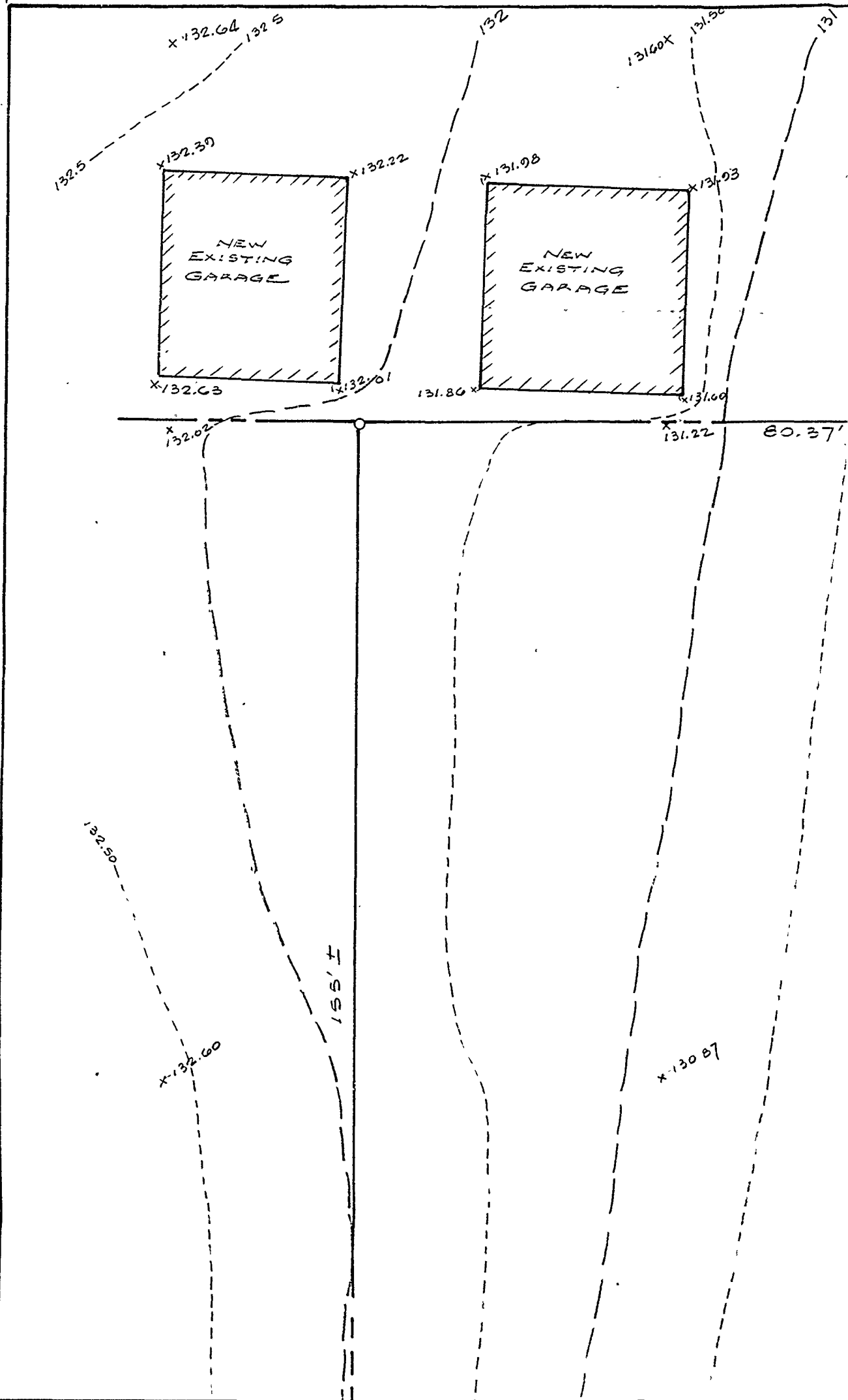
8.4 BARBECUE PIT

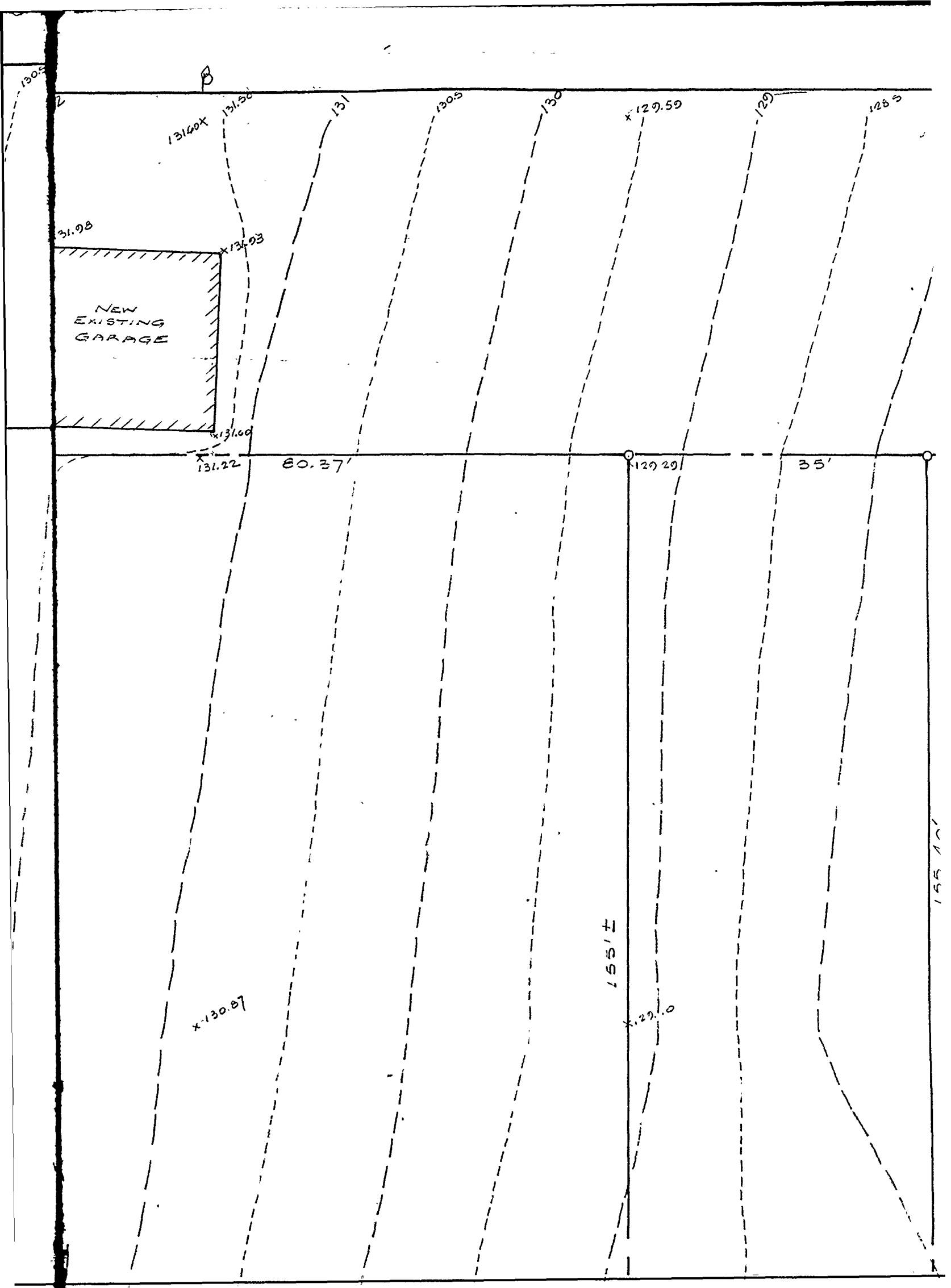
The barbecue pit at 112 E. Stewart Avenue which was destroyed during soil excavation was replaced with a similarly constructed masonry pit on July 24 and 25, 1989.

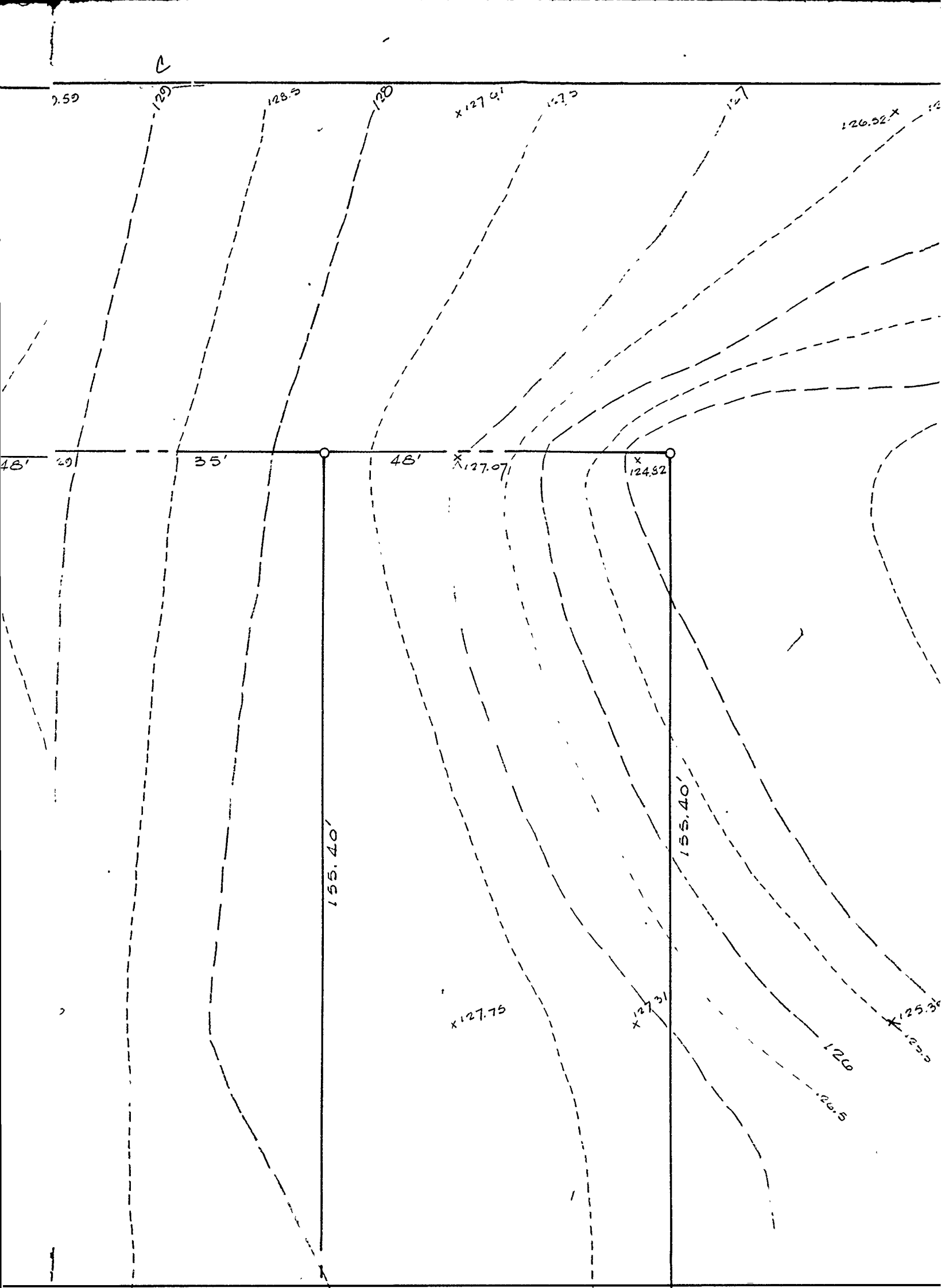
8.5 TRELLISES

Two wooden decorative trellises were replaced on the 112 E. Stewart Avenue garage on August 1, 1989.

A







E.

4.25



LOCATION MAP

NOTES:

1. BENCH MARK:
CHISELED SQUARE CUT IN TOP OF BRIDGE WALL AT
SOUTHEAST CORNER OF BALTIMORE PIKE BRIDGE
OVER DARBY CREEK.
2. ELEVATION. 70.78 (NATIONAL GEODETIC VERTICAL
DATUM OF 1929)

LEGEND:

100 — — — — — 100 = EXISTING CONTOURS
99.5 - - - - - 99.5

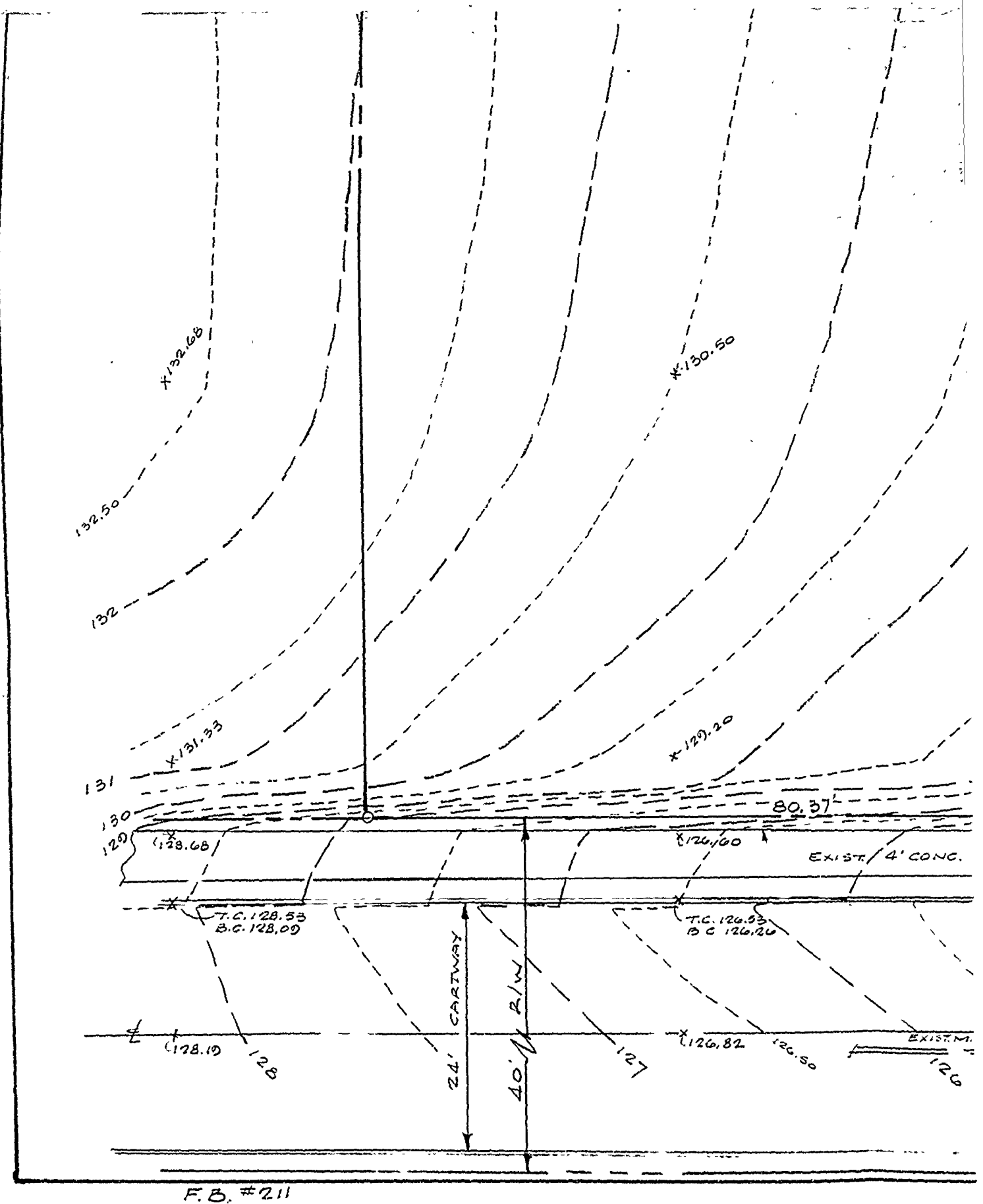
F

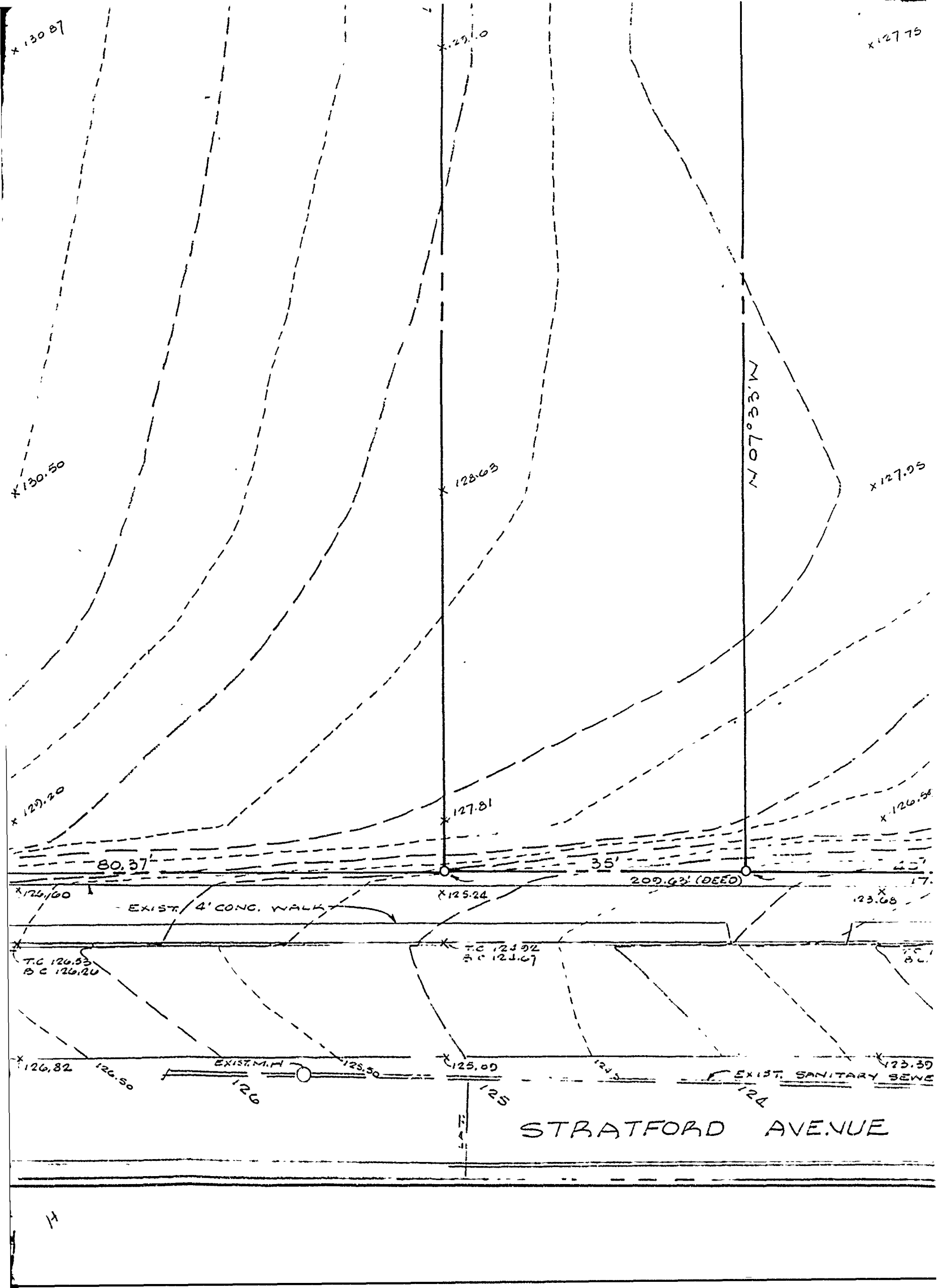


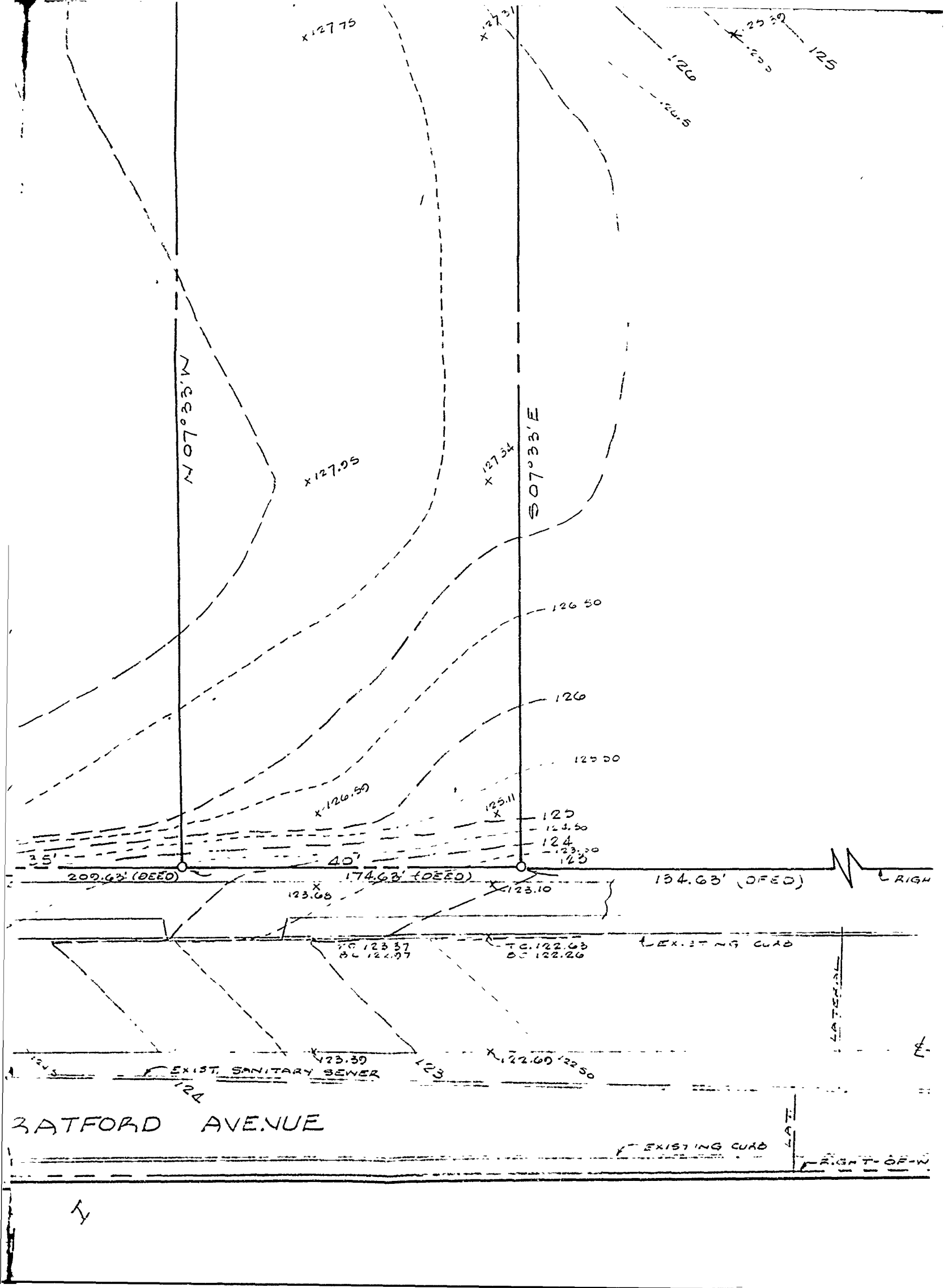
LOCATION MAP

TOP OF BRIDGE WALL AT
BALTIMORE PIKE BRIDGE
LOCAL GEODETIC VERTICAL

LISTING CONTOURS







LEGEND:

100 — — — — — 100 = EX.
100 — — — — — 100

125
126
127

UNION

AVENUE

50' R/W

134.63' (DEED)

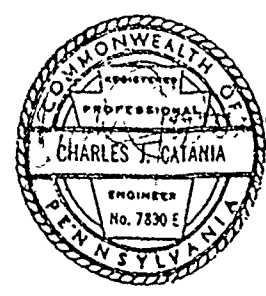
RIGHT-OF-WAY LINE

EXISTING CURB

EXISTING CURB

EXISTING CURB

RIGHT-OF-WAY LINE



TOPOGRAPHICAL PLAN

LANSLOWNE RADIOACT

105 - 107 EAST ST

BOROUGH OF LANSLOWNE

CATANIA ENGINEER CONSULTING

520 W. Mac DADE BOULEVARD

DWN. BY E.D.L. CKD. BY C.J.C.

DSG. BY C. DATE 7/5/89

1

LEGEND:

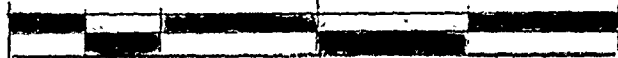
100 --- 100 = EXISTING CONTOURS
95.5 - - - 95.5

UNION

50' R/W

AVENUE

0 5 10 20 30 40



GRAPHIC SCALE (IN FEET)

TOPOGRAPHICAL PLAN OF FINISHED GRADE

LANSLOWNE RADIOACTIVE RESIDENCE COMPLEX

105 - 107 EAST STRATFORD AVENUE

BOROUGH OF LANSLOWNE

DELAWARE CO., PA.

CATANIA ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS

520 W. Mac DADE BOULEVARD

MILMONT PARK, PA. 19033

DWN. BY E.D.L. CKD. BY C.J.C.
DSG. BY C. DATE 7/5/80

SCALE
1" = 10'

DRAWING NO. 83037
SHEET 1 OF 1 SHEETS



K